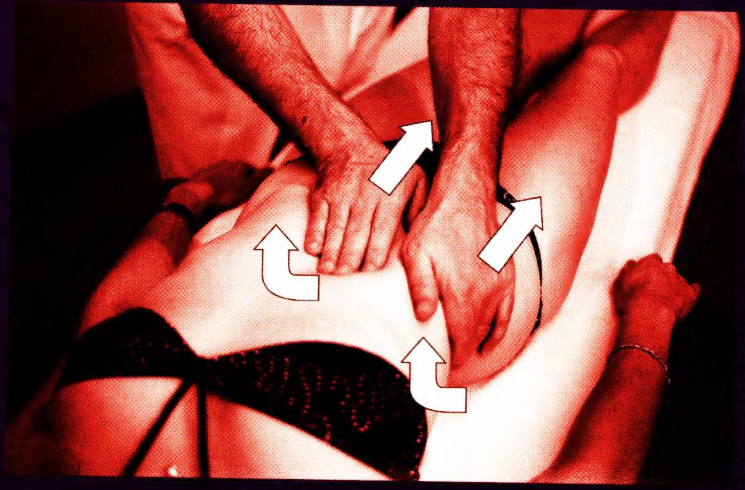
Georges Finet, DO ▪ Christian Williame, DO

Treating Visceral Dysfunction



An Osteopathic Approach to Understanding and Treating the Abdominal Organs

Treating Visceral Dysfunction

Treating Visceral Dysfunction

An Osteopathic Approach to Understanding and Treating the Abdominal Organs

Georges Finet, D.O.
Christian Williame, D.O.
(Belgium)

STILLNESS PRESS

Stillness Press, LLC.
PO Box 18054
Portland, OR 97218
Phone/Fax: 503.265.5002

See page 169 for ordering information.

Edited by Rachel E. Brooks, M.D.
Book and cover design by Lubosh Cech
Illustrations by Clovis

ISBN 0-9675851-2-0

This work is an edited version of the original work *Biométrie de la dynamique viscérale et nouvelles normalisations ostéopathiques.*
© 1992 Editions Roger Jollois
Post Office Box 1067 - 87051 Limoges cedex
Legal filing: 3rd quarter 1992
ISBN 2-87928-011-7

Contents

Foreword to the English Edition

I first met Georges Finet and Christian Williame in the spring of 1999, at a course they were teaching in visceral biodynamics. I was impressed with the depth of their knowledge, the research they had done, and the simplicity of their techniques. As I applied what I had learned from them in my practice, I found that I was able to achieve results with patients that were better than I had come to expect.

Osteopathic treatment of the viscera is nothing new; Drs. Still, Sutherland, Woodhall, Young, McConnell, and Hoover referred to it around the turn of the century. More recently we have seen many books in French, German, and English by Jean-Pierre Barral, Caroline Stone, Jacques Weischenk, Phillippe Curtil, André Metra, and others. What has been lacking is any documentation or measurements of the movement of the viscera.

During their osteopathic training, Finet and Williame were taught that the viscera were moved with respiration, but they wanted proof, so they started using fluoroscopy and ultrasound to see what actually happened with inhalation and exhalation. This research has now continued for over 15 years, and what has emerged is a clear representation of the normal axis and distance of movement for each organ, and how this is effected in pathological states. Ongoing research is focusing on specific conditions and their patterns and on lesion chains. Finet and Williame are extending their work even farther by working on a software program that could be used in any radiology department to assess whether patients need osteopathic manipulation of their viscera.

Historically, within osteopathy, there have been a wide range of points of view in looking at the body. Some have held a strictly mechanical view, others a strictly energetic one. Some emphasize the anatomical picture, while others emphasize the physiological picture. Osteopathy also encompasses the view that structure affects function and that function can affect structure. Finet and Williame are clearly on the mechanical side of the spectrum with a strong appreciation for the

relationships between anatomy and physiology and structure and function. My own clinical experience supports the view that unless the movements of mobility are normalized, motility (inherent movements) will be compromised.

Based on their research and clinical experience, Finet and Williame have developed many valuable ideas. One idea that I find particularly important is that as the abdominal viscera descend in inhalation, their attachments are looser, which allows for an increase in blood flow. Consequently, if the attachments are too restricted, the organ can suffer a decrease in blood, oxygen, and nutrition coming in with an increase in retained metabolic by-products. This being the case, their treatment approach is to "normalize" the tension in the attachments of the organs, thus seeking to normalize the exchange of fluids and nutrition to the organs.

Finet and Williame bring us a logical, methodical, and practical system for diagnosing and treating abdominal viscera. They have written a landmark book for the profession of osteopathy.

Kenneth Lossing, D.O.

Preface to the English Edition

The material in this book was originally published in French in 1992 as *Biometrie de la dynamique viscerale et nouvelles normalisations osteopathiques (Biometry of the Visceral Dynamic and New Osteopathic Normalizations)*. This work is based on research that Finet and Williame, Belgian osteopaths, initially undertook for their master's thesis. The order of presentation of the material in the French edition reflects this. For this English edition, the foundational research material has been placed at the back of the book while the supporting material most pertinent to the practitioner has been reorganized and brought forward.

All the material from the French edition is contained in the English version. In addition, the English version contains a number of normalizations the authors have developed since the original publication of their work. There are also a few places in which the text has been changed to reflect the authors' evolving understanding.

The English manuscript that was provided to me was translated faithfully from the French edition; however, the English was obscure and difficult to understand. Therefore, there was much correspondence between the Belgian authors and myself to clarify the meaning. As a result, I and the authors are confident that their meaning has been accurately maintained in this English language edition.

A few comments about word usage. In this text, anatomical terms have either been left in their Latin form or, more often, translated into common American terminology. I have retained the authors' usage of the word "normalizations" to describe the procedures they use, instead of changing it to the usual term, "techniques." I believe the meaning inherent in the word "normalization" is congruent with the osteopathic concept. It matches well the idea that all osteopathic procedures are aimed at helping the body to make a shift in the direction of more healthy functioning.

Since the original publication of the French book in 1992, Finet and Williame have continued their research with further biometric studies

and evaluation of their clinical results. This subsequent work is described in the Afterword, entitled "Summary of Further Research—2000." A part of that research is the demonstration of the correlation between clinical symptoms and measurable impairments in function. When that work is complete, it will be an invaluable contribution to the field of osteopathy.

The work presented in this book is important for a number of reasons. One reason is because it defines, in a scientific way, the movement of the abdominal viscera under the influence of the diaphragm. From the earliest days of osteopathy, the importance of the unimpeded function of the diaphragm has been emphasized, particularly as it relates to healthy visceral function. Yet the precise nature, degree, and direction of that diaphragmatic influence on visceral movement had never been described.

While the knowledge osteopaths gain from their hands-on experience serves them well, it is also an osteopathic maxim that the clearest anatomical and physiological understanding must always be sought. Therefore this more precise picture has great value to the osteopathic practitioner. In addition, this research-based knowledge of Finet and Williame will benefit the osteopathic medical profession as a whole because of the growing demand for quantifiable scientific evidence.

This book is also important because it is a clear example of the development of a new approach to treatment which is based on sound osteopathic principles. The integrity of Finet's and Williame's "osteopathic thinking" is evident in all their writings and work. Accepting the unity of structure and function and the self-healing capacity of the body, they have carefully studied the relevant anatomy and physiology, and from this developed a rational treatment approach. Fortuitously, for those trained in osteopathic reasoning and palpatory skills, the approach is one that is straightforward to understand and apply.

Rachel E. Brooks, M.D.
Medical Editor

Foreword to the French Edition—1992

In recent years, the osteopathic literature has been enriched by several works which are the fruit of research in the expanding field of osteopathic medicine. Few of these, however, demonstrate the qualities of this work, wherein visceral dynamics are discovered, defined, and confirmed by a detailed statistical study.

Studying these detailed research results can seem difficult, but I invite the reader not to skip over this part of the authors' work. The practitioner will better understand and appreciate what follows from it: the diagnostic palpation of the abdomen and the osteopathic visceral normalizations.

This book is the product of several years of abundant and far-reaching study and research on the part of the authors, Finet and Williame. I wish to pay tribute to their intellectual honesty and their talent in passing on to us the results of their work. Finally, I wish to emphasize the multidisciplinary nature of the work which was accomplished by the authors in conjunction with Dr. Phillippe Dehaene, radiologist, and Nicolas Gretry, biomechanic and statistician. Both of these men need to be thanked for their ready availability and openness of spirit.

The publication of this work is an event of great importance. Osteopathy needs this type of scientific research, the impact of which will be evident to all those who read this book. It should occupy a significant place in the library of every osteopathic physician as well as of any doctor who is called upon to treat digestive problems.

Robert Kriwin, D.O.

President, Belgian Academy of Osteopathy (1990-present)

Preface to the French Edition—1992

Until this current work, no scientific study of the abdominal organs' displacement under the influence of pressure from the diaphragm has been available. We discovered this was true in 1985 when we searched various bibliographic sources in Europe as well as in the United States. An estimation of this movement and certain observations had been made based on anatomy and physiology, but there was no statistical study. Thus, the scientific analysis presented in this book is foundational because, as Louis de Broglie wrote poetically, "in tearing the veil, more light is shed."

This study has been carried out with all objective rigor; our desire was to accurately show what exists without any subjective influence from us. When we started this work in June 1985, we knew we had to find the imaging technique which would allow an optimal approach to the organs; establish a strict protocol and methodology; and delineate any sources of error, which could then be analyzed and circumvented.

After establishing a methodology we then carried out a series of examinations. In order to evaluate them, we sought the collaboration of a statistician for help in setting up the program and interpreting the results. This part of the project involved three years of research yielding 24 hours of video tapes and 3,000 X-ray negatives. According to our knowledge, the imaging techniques used here remain the only means of carrying out such a study in an accurate way. Neither the CT scanner nor nuclear magnetic resonance imaging could have helped us in this field.

The results of this research led us to our conclusion that organized and repetitive dynamics do exist on the visceral level. At the end of three further years of study, we developed a program of normalization based on our conclusions. At the time of writing these lines, these normalizations have been used on more than 5,000 patients.

As it has existed until now, the practice of "visceral osteopathy" can be difficult and, as a result, is not used often. We have tried to

simplify it—to make it well defined, objective, practical, and accurate—in order to allow the practitioner to use it whenever there is the need.

❑ ❑ ❑

We wish to thank Edgar S. Miller, D.O. from Massachusetts; our Belgian colleagues, Jean-Pierre Hamerlinck, D.O., Robert Kriwin, D.O., Daniel Ronsmans, D.O., and Willy Vandenschrick, D.O.; and everyone else who kindly helped us each time they had the opportunity. Many thanks also to Thérèse, Nicolas, Pascale, Clovis. . .and all the others.

Georges Finet, D.O (Belgium)
Christian Williame, D.O. (Belgium)

part one

Understanding the Visceral Dynamics

chapter **1**

Introduction

The osteopathic concept holds that freedom within all the structures and elements of the body is one of the keys to healthy function. From the beginning of osteopathy, it has been understood that included among these structures are the body's viscera and fascial tissues. In this book, we will present our understanding of how the abdominal viscera function in health, how that function could be disturbed, and how to correct those disturbances. This understanding is based on research we did to document and measure the normal movements of the abdominal viscera. The results of this research, taken together with the osteopathic principles of the unity of structure and function and the self-healing capacity of the body, led us to develop a unique approach to visceral normalizations.

We view somatic dysfunction of the viscera as a disturbance of an organ's homeostasis that could arise from any restrictive, congestive, or sclerotic phenomenon resulting from a stress, whether it be alimentary, traumatic, or psychological. Two of the critical factors affecting visceral function, we believe, are the state of the associated fascia and the rhythmic motion of the diaphragm. Anything that creates a disturbance in the local or regional fascias could provoke—within the circulatory, lymphatic, and neurovegetative systems—constraints that could harm the anatomicophysiological integrity of the organs dependent on these systems. We also believe that all visceral disturbances, in turn, will be reflected within the associated fascial tissue.

(Note: "Somatic dysfunction" is an osteopathic term defined as: The impaired or altered function of related components of the somatic system including skeletal, arthrodial, and myofascial structures; and related vascular, lymphatic, and neural elements.)

We view the motion of the diaphragm as crucial because the abdominal viscera receive, with each inhalation, the diaphragm's dynamic

impulse, and the viscera are moved as a result. Because of this interdependency, any disturbance of this biodynamic has the potential of upsetting the homeostasis and creating dysfunction, which could lead to illness. We have named this relationship between diaphragmatic and visceral functioning "the biodynamic viscerodiaphragmatic system." It is a system we found to be organized in a precise and orderly way. In this system the viscera are shifted under the influence of the diaphragm's pressure in a consistent, reproducible manner.

Visceral normalizations in osteopathic medicine have as their aim the release of all tension restraining the original diaphragmatic dynamic imposed on the intra-abdominal organs. Having used the diagnostic and treatment methods we will be presenting on thousands of patients, we have been able to observe that when the physical findings normalize, the patients often report a disappearance of their visceral symptomatology. This tends to confirm that structure and function are linked in the visceral system: By resolving the disturbed dynamics of an organ, we may be able to restore homeostasis to that organ.

Principles of Diagnosis and Treatment

There are two unique features in our discussion of our understanding of the visceral dynamics and the treatment of problems with the abdominal viscera. One is the statistical confirmation of the viscerodiaphragmatic biodynamic, and the other is the program of normalizations based on those statistics. While this biodynamic viscerodiaphragmatic function has been described in previous works, the visceral movements had never been precisely measured or defined in this way before. This was our objective in undertaking the research presented in this book.

Based as it is on research, this work is not simply the presentation of a theory, but is the presentation of observations gathered with strict objectivity. The study of the gastrointestinal biodynamic was accomplished through the use of X-ray examinations, and the study of the biodynamic of the liver, pancreas, kidneys, and spleen was achieved through the use of echography. We analyzed more than 3,000 X-ray negatives and echographs extracted from 24 hours of video recordings. As a result, we were able to confirm, with a reasonable degree of certainty, the normal dynamics of healthy organs and to suggest a precise, quickly

effective, minimally invasive program of normalizations for organs in somatic dysfunction.

The program of visceral normalizations we developed is based both on our precise observations of the visceral dynamics and on our understanding of functional anatomy. These normalizations are notably different from others because they avoid the sometimes uncomfortable and ticklish problem of deep palpation, which can be a stumbling block in other visceral approaches. Prior to this work, two major types of visceral normalization have been taught in the osteopathic field. One employs a direct method in which the organ is lifted, with the hand moving toward the organ. The other approach is one of fascial normalization with a focus on motility, which requires a manual movement that is variable and difficult to describe because you have to "follow the fascia" and feel the motility.

These are both different from what we will describe. What we are suggesting is halfway between these two techniques—a precise gesture aimed at reproducing on the superficial fascia the dynamics of the healthy organ, with the goal of liberating all tensions that restrain the free functioning of the viscerodiaphragmatic dynamic. Our viewpoint is that the osteopathic visceral normalization is probably, above all, a fascial normalization and not directly a normalization of the organ.

Although individual fascias are named distinctly according to their anatomic localization, they are all one tissue. They are one fascial unit, with no break in continuity from head to toe and from the skin to the very depth of the being.

This vast web of fascia, with its adaptability, expresses local and regional disturbances. Because of the continuity in the fascia, disturbances in either the underlying organ or its surrounding fascia are able to be reflected in the superficial fascia as well. Given these understandings, we believe we are able to perceive, without deep palpation, the functional state of the organ within its fascial environment. If all visceral disturbances are reflected within the neighboring fascial tissues, a light perpendicular palpation over the organ is sufficient for diagnosis. In treatment, we have also found that there is no need to use a deep palpation for the fascia, given our view of the continuity from the surface to the depth and the depth to the surface.

We believe this idea that we are palpating the fascia and not the organ itself to be an important one. For one thing, the wide individual variations in the positions adopted by the viscera in the abdomen make it difficult to say with certainty that we can locate, palpate, or manipulate a given organ. Also, we do not conceive that we are palpating *lesions* in an organ, but instead we are perceiving a *dysfunction* in the area.

The goal of the treatment maneuver is to reinduce the normal dynamics of the organ. We believe that these rhythmic, systematic dynamics influence the quality of the associated fascia. If the dynamics are of a good quality, it is more likely that the neurological and vascular elements contained in the fascia will maintain their integrity and assure good visceral homeostasis. It also follows that a disturbance in the visceral dynamics could induce a mechanical irritation and a fascial fibrosis, resulting in a pathologic cycle maintaining the disturbance.

In our diagnostic approach to the abdominal organs, the osteopath takes advantage of this effect on the tissues. Fascial tissues affected by the disturbance of the organ they contain, or fascial tissues which themselves are disturbing the organ they contain, will have lost some of their normal resiliency. This method allows one to recognize and to select, in an easy, simple, and precise way, the disturbed organ or organs to receive treatment.

The treatment method depends on a precise knowledge of the visceral dynamics and relies on the known fascial continuity from the surface to the depth. It is accomplished, as the patient lies supine, by applying stretching movements to the surface, often in rhythmic conjunction with diaphragmatic respiration. The main contraindications for the normalizations include an acute abdomen, as seen with peritonitis, appendicitis, pancreatitis, perforation of the stomach, ruptured spleen, and so forth; cancers; aneurysm of the aorta; and biliary stones.

In the approach presented in this book, the osteopath integrates the analysis of the visceral sphere into his holistic view of the case to be treated. Somatic dysfunction of the viscera can occur together with the sum total of all the somatic dysfunctions in the individual, including involvement of the body, cranium, fascia, gynecological system, and so on. Reciprocal influences can exist between the somatic dysfunction of

the viscera and all other systems, including a reciprocal relationship with neuropsychological factors. Because of these reciprocal influences, it is possible, by treating the loss of the visceral dynamics, to affect local dysfunctions such as dyspepsia, bloating, and constipation as well as general ones such as dorsal and lumbar back pain.

Research of the Visceral Dynamics

In our study, the fundamental question we asked ourselves was: Are the displacements of the organs random or is there a repetitive character to the movement for the same organ in the same patient? Our study supported the finding of a reproducible movement for each organ.

The methodology we used required the patient to stand upright during the studies, which gave the advantage of reproducing the conditions of everyday life. The force of gravity presses on each organ, and in turn there are reaction forces that moderate the force of gravity. These reaction forces include ones from the organ itself as well as those coming from bone structures, other organs, fascia, and muscles. The main muscular forces, which modify all the others, principally come from the diaphragm. These forces are thought to be "balanced" inferiorly by the pelvic muscles, anteriorly by the abdominal muscles, and posteriorly by the quadratus lumborum, and so on.

The pressure of the dynamic forces not only moves the entire organ, but also creates a relative deformation within each organ. The observations we made of this deformation support the concept of systematic visceral dynamics because we did not observe an isolated or unusual deformation but a repetitive one—the organ adapts itself in an identical way at each inhalation to the forces to which it is submitted. Moreover, this deformation is minimal compared to what one would imagine possible in the case of a hollow organ.

Throughout this book, in our summary of how the organs move, we describe only the statistically clear, consistent dynamics of the movements of each organ. We have left out the less clear shifts because they are not taken into account for the normalizations. In Part 4, where the research method and results are presented, a more complete statistical report is given. In addition, the discussions we have included of

anatomy and visceral physiology contain only the notions that are essential for the demonstration of our study. For more complete information on these subjects, we refer the reader to the standard textbooks.

Summary

Let us remember that the visceral normalizations in osteopathic medicine have the aim to liberate, by manual techniques, all tension restraining the original diaphragmatic dynamic imposed on the intra-abdominal organs. The goal of the visceral normalizations is to restore the homeostasis within the environment of the organ (the fascia), within the organ itself, and within the circulatory, lymphatic, and neurovegetative systems that regulate and are affected by the visceral system. We believe these normalizations are effective because of the continuity that exists between the environment around the organ and the organ itself. It is also understood that these visceral normalizations are integrated into a total treatment approach for each case.

The normalizations found in this book attempt to restore plasticity and elasticity by affecting the environment around an organ instead of by trying to approach the organ itself. In all our discussions, we speak of normalization of the *zone* or *area* of the organ. We do this not only because of the real difficulty in contacting the organ itself with certainty, but also because it seems to be a more accurate description of the current state of our understanding. We believe that tensions in the fascia which lie between the organ and the palpating hand can inform us that the organ's function is disturbed. But it is also possible that the tension only involves the fascia.

The normalizations we present require precision, but are easy to apply, and it is immediately possible to establish whether or not there has been an effect by means of the physical examination. As we have emphasized, the technique we suggest here is simple, quickly effective, and minimally invasive. It allows us to respect painful or sensitive abdomens and to avoid traumatizing sick tissues by delving too deeply into the abdominal area. It gives the osteopath the opportunity to effect a deep change through a fairly gentle approach.

chapter **2**

Applied Anatomy and Physiology

In this chapter, we will present a brief overview of the anatomy and physiology relevant to our study. For more complete information on these subjects, the reader is encouraged to consult the standard textbooks.

The boundaries of the abdominal visceral system are formed by the anterior, lateral, and lumbovertebral abdominal walls. The viscera situated inside these walls include the liver, spleen, kidneys, pancreas, and gastrointestinal system. Most of these viscera are enclosed in the peritoneal bag and are joined among themselves by the peritoneal extensions—the omenta, ligaments, and mesenteries. The tail of the pancreas and the kidneys are extraperitoneal. The abdominal organs are separated from the cardiorespiratory system by the thoracic diaphragm and are also isolated from the genitourinary system by several fascias.

THE DIAPHRAGMATIC MECHANISM

The dynamic function of the diaphragm is of great importance and deserves the full attention of the osteopath. Because the diaphragm is the engine of the visceral dynamics, it is logical to check its function before any visceral intervention. The function of the diaphragm is also critically important because it is thought to play a key role in the circulatory and neural integrity of the viscera, and as such, according to the global philosophy of osteopathic medicine, the diaphragm takes part in the homeostasis of the human body.

A standard description of diaphragmatic function is that during inhalation the diaphragm descends and, finding support on the abdominal organs and acting against the abdominal pressure, establishes the lever arm necessary for the contraction of the central tendon of the

diaphragm to elevate the ribs. This view, however, is not satisfactory for several reasons:

- The visceral mass (more specifically the liver, spleen, and stomach, which are the first to receive the pressure) is mobile and so does not constitute a functional stable point.

- The gastric fundus, in spite of the ligament linking it to the diaphragm, does not maintain, in the majority of cases, contact with the diaphragmatic arch during inhalation and, therefore, is also not a functional stable point.

- In order for a muscle to contract, it is essential that it has enough stable points at its disposal to assure a real fixity. We do not see how the simple opposition of the visceral pressure could securely assure this fixity for the central tendon of the diaphragm.

- The integrity of the abdominal wall is not constant enough (muscular weakness or paralysis) to assure a definitive, reliable counterpressure.

- The visceral mass is, moreover, frequently the site of important modifications, such as enlargement or shrinkage, congestion, sclerosis, ptosis, and even surgical interventions (splenectomy, etcetera). All these disturbances could significantly modify the diaphragmatic support points and the abdominal pressure to the extent of, theoretically, seriously impairing the respiratory act or of making it impossible.

As a result, in our view, it is difficult to maintain this hypothesis concerning the existence of a visceral support point. In order to explain the diaphragmatic support point and the associated costal elevation, a different hypothesis seems to us more likely. Based on an anatomical analysis, we hypothesize a *chain* instead of a support point. We call this chain the *phrenic-mediastinal-vertebral-cranial chain.*

The Phrenic-Mediastinal-Vertebral-Cranial Chain

Rouvière describes the pericardium as being linked to the skeleton and to the organs by fibrous strips or lamina, which are called ligaments

(*Anatomie humaine*, Vol. II, pp. 138–140 and fig. 95). The principal ligaments of the pericardium are the phrenopericardial ligaments, the superior and inferior sternopericardial ligaments, and the vertebropericardial ligaments. In addition, the pericardium itself continues onto the diaphragm, where it is very adherent, forming a dense fibrous layer. The superior sterno-pericardial ligament is the prolongation of the deep thin sheet of the pretracheal fascia. The vertebropericardial ligaments are fibrous strips, the insertions of which mingle with those of the prevertebral fascia, from the sixth cervical to the fourth dorsal vertebra (fig. 2.1).

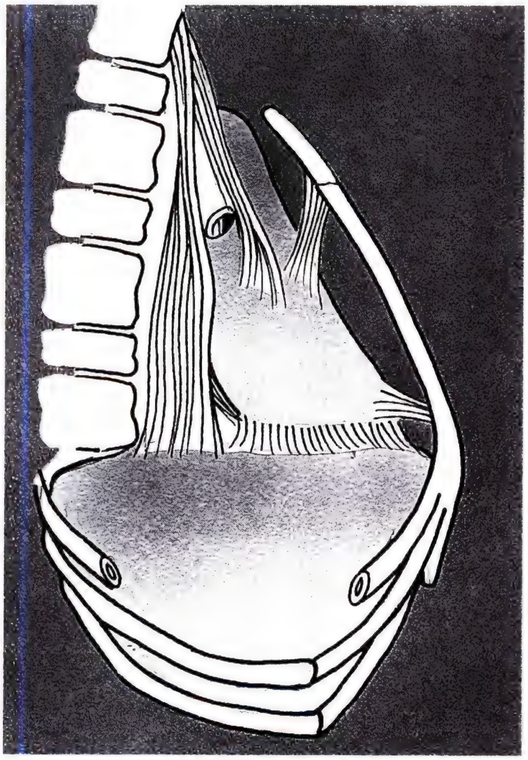


Fig. 2.1. The ligaments of the pericardium (according to Rouvière)

Thus, this ligamentary apparatus assures, at the least, a continuity between C6 and the diaphragm, and if we follow the deep thin sheet of the pretracheal lamina, we discover that:

- It originates on the hyoid bone and joins up with the deep lamina of the visceral sheath to form the thyroid or cervicopericardial lamina.

- This visceral sheath is attached to the prevertebral lamina, which stretches from the cervical transverse processes to the superficial layer of the deep cervical fascia.

- In the neck, this superficial fascia forms a complete sheath that is attached above to the superior nuchal line, mastoid process, cartilage of the auditory meatus, masseteric fascia, and inferior border of the mandible. Below, it is attached to the jugular incisure (suprasternal space), manubrium, superior surface of the clavicle, and spine of the scapula.

- An expansion of the visceral sheath, the pharyngobasilar fascia, joins to the median pharyngeal raphe and attaches itself at the base of the cranium: from the pharyngeal tubercle (on the basilar part of the occiput) up to the carotid canal and the inferior surface of the petrous part of the temporal bone and at the posterior edge of the medial pterygoid plate.

It is a fundamental point that all this fascia exists without any break in continuity. One can see from this brief review that there is a continuity of the fascia that exists between the temporal and occipital bones and the respiratory diaphragm. The fibrous pericardium contributes to this continuity because it mingles with the fascia of the respiratory diaphragm.

Based on this analysis, we prefer the following model regarding diaphragmatic support: When the diaphragm descends, it provokes a longitudinal tension within the phrenic-mediastinal-vertebral-cranial chain. When this relatively inelastic chain arrives at its maximum extension, it provides a support point to the diaphragmatic arch, which then has a way to lift the rib cage. A further observation is that the great vessels, the large circulatory trunks that reside in the mediastinal space and whose coverings are continuous with the pericardium, cannot undergo an infinite amount of stretching and thereby form a support. It is also probable that the limited extensibility of the lung tissue and pleura plays a role.

We also believe that the crura (lumbar parts) of the diaphragm play the role of inferior fixed points, preventing the diaphragm from going up under the tension of the chain, thus allowing the respiratory act to

extend itself fully. In addition, the intra-abdominal pressure and the viscera would also still be playing their accepted contributory role in this movement.

Osteopaths who have worked in the visceral field have often proposed specific “mechanical visceral continuations” or “chains” to indicate what it is that leads to the anatomicophysiological loss of integrity of a given system, organ, or visceral element. We believe that all these descriptions of “mechanical continuations” are less useful than the notion of the phrenic-mediastinal-vertebral-cranial chain or continuation we have just described because it takes into account all the elements. There are also other influences to be considered: cardiocirculatory, lymphatic, neurovegetative, neuropsychological, psychosomatic, somatopsychic, and so forth. In the end, whatever one’s conceptual model, only one’s knowledge of anatomy and physiology, palpation, and the ability to synthesize the gathered elements and basic notions allow for a truthful osteopathic approach.

In summary, it is our view, based on this reasoning, that the diaphragm gains support from the base of the cranium and from the cervical, dorsal, and lumbar spines in order to achieve full costal movement. This very important phrenic-mediastinal-vertebral-cranial chain and its visceral influence deserve the full attention of the osteopath. This holistic approach seems essential when it comes to thinking of freeing the diaphragmatic function.

HEMODYNAMICS AND VISCERAL DYNAMICS

The Arterial Plexus and the Mesenteries

Here we will describe some pertinent anatomic features to keep in mind.

The stomach (fig. 2.2): The omenta attached to the stomach contain the arterial circles of the greater and lesser curvatures.

The duodenum (fig. 2.3): The duodenum circumscribes the large superior and inferior mesenteric vessels. A portion of the duodenum, from the origin of the first part to the third part of the duodenum, closely adheres to the head of the pancreas. The duodenum and the pancreas have been described as being like "the tire and the rim of a car wheel" (Perlemuter and Waligora, *Cahiers d'anatomie*, Abdomen I, p. 32).

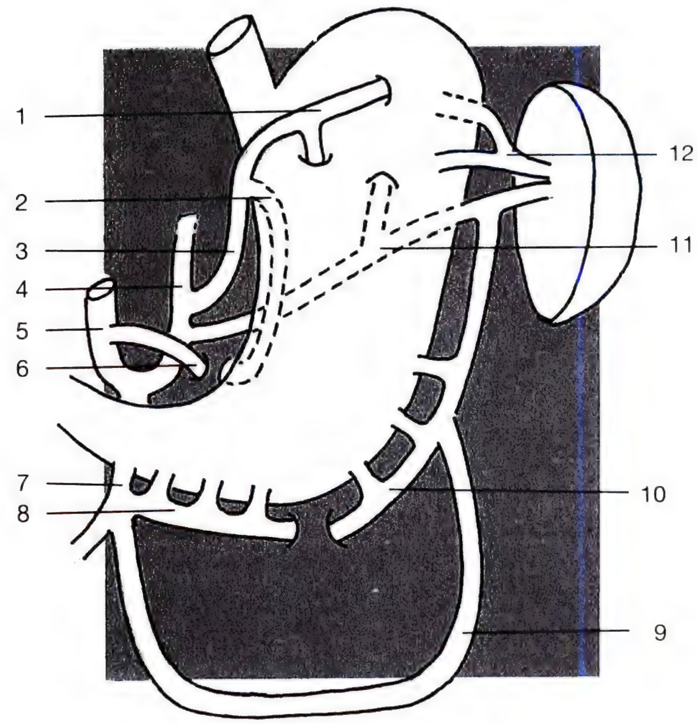


Fig. 2.2. Gastric arterial system (after Perlemuter and Waligora)

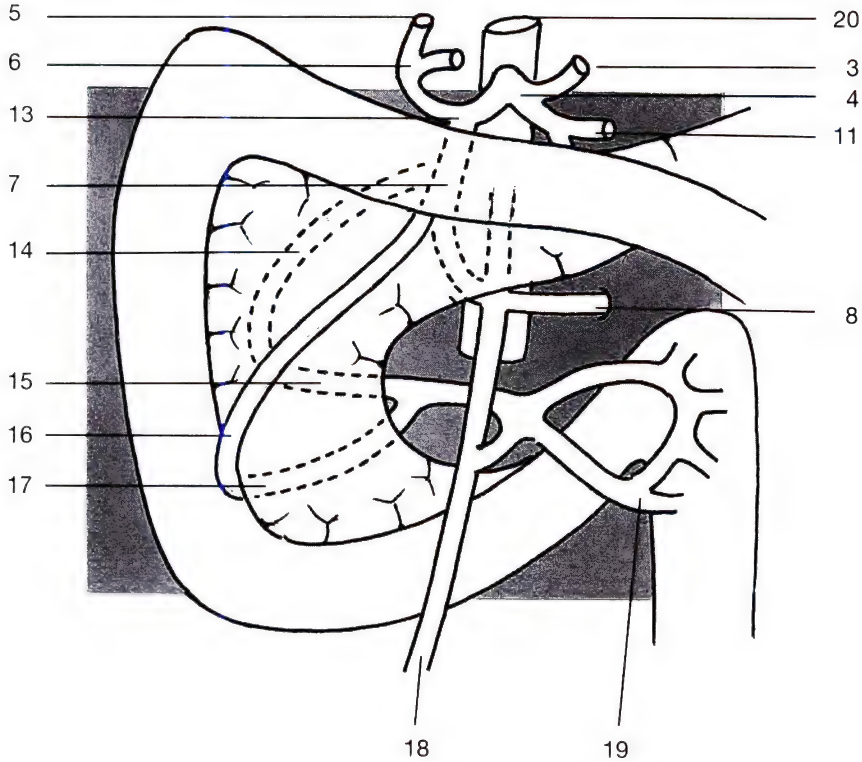


Fig. 2.3. Duodenal-pancreatic arterial system (after Perlemuter and Waligora)

The duodenal-pancreatic and gastric arterial systems (figs. 2.2 & 2.3)

1. Anterior gastric artery
2. Posterior gastric artery
3. Left gastric artery
4. Celiac trunk
5. Hepatic artery proper
6. Right gastric artery
7. Gastroduodenal artery
8. Right gastro-epiploic artery
9. Epiploic branches
10. Left gastro-epiploic artery
11. Splenic artery
12. Short gastric arteries
13. Common hepatic artery
14. Posterior superior pancreaticoduodenal artery
15. Posterior inferior pancreaticoduodenal artery
16. Anterior superior pancreaticoduodenal artery
17. Anterior inferior pancreaticoduodenal artery
18. Superior mesenteric artery
19. Jejunal arteries
20. Aorta

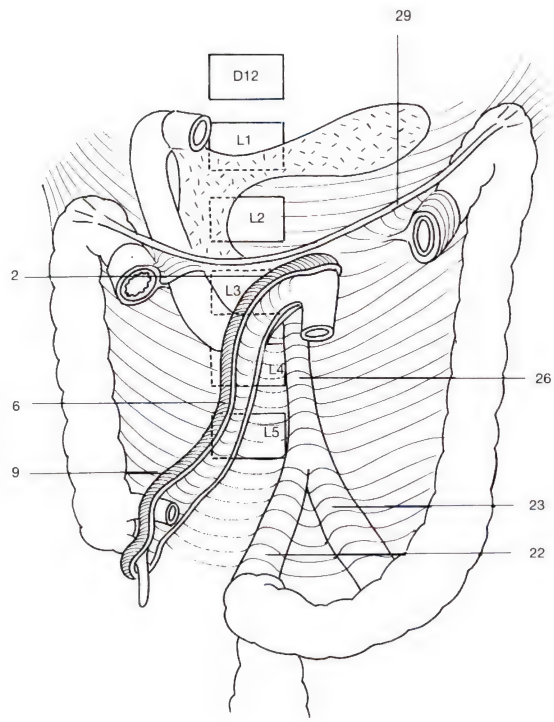


Fig. 2.4. Intestines with mesentery and mesocolon

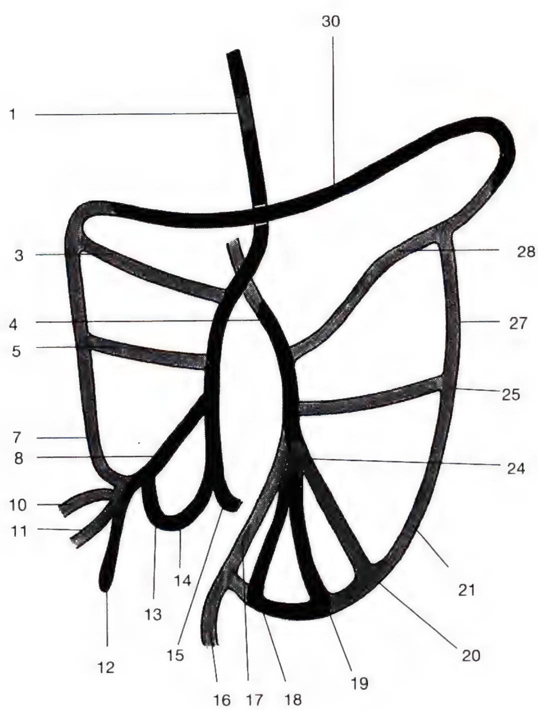


Fig. 2.5. Colic arterial system

Mesentery, mesocolon, and the colic arterial system (figs. 2.4 & 2.5)

1. Superior mesenteric artery
2. Superior segment of the root of the mesentery
3. Right colic artery
4. Inferior mesenteric artery
5. Ascending colon artery (inconstant)
6. Middle segment of the root of the mesentery
7. Ascending artery
8. Iliocolic artery
9. Inferior segment of the root of the mesentery
10. Posterior cecal artery
11. Anterior cecal artery
12. Appendicular artery
13. Ileal branch of the ileocolic artery
14. Terminal branch of the superior mesenteric artery
15. Origin of the arch of the ileal and jejunal arteries
16. Terminal branch of the inferior mesenteric artery
17. Inferior mesenteric artery
18. Sigmoid artery (third)
19. Sigmoid artery (second)
20. Sigmoid artery (first)
21. Ascending branch of the first sigmoid artery
22. Primary root of the sigmoid mesocolon
23. Secondary root of the sigmoid mesocolon
24. Sigmoid trunk
25. Descending colon artery (inconstant)
26. Summit of the root of the sigmoid mesocolon
27. Descending artery
28. Left colic artery
29. Root of the transverse mesocolon
30. Anastamosis of the superior and inferior mesenteric arteries (Riolan's anastamosis)

The jejunum and ileum and the colon (figs. 2.4, 2.5, and 2.6): The root of the mesentery is extended, in its distal part, by the attachment of the ascending mesocolon, which is followed by the root of the transverse mesocolon, which continues with the attachment of the descending mesocolon. The iliac mesocolon then takes over and meets the secondary root of the sigmoid mesocolon, which it crosses at the level of its union with the primary root of the sigmoid mesocolon.

The root of the sigmoid mesocolon has the shape of an upside-down "Y." Its upper arm is extended by the posterior parietal peritoneum (fascia of Toldt), which meets the left transverse mesocolon. The loop, thus closed, appears roughly to be a figure eight, the origin of which is the superior segment of the root of the mesentery and the end of which is the joining of the left posterior parietal peritoneum with the left transverse mesocolon. The arrangement reflects the embryological development.

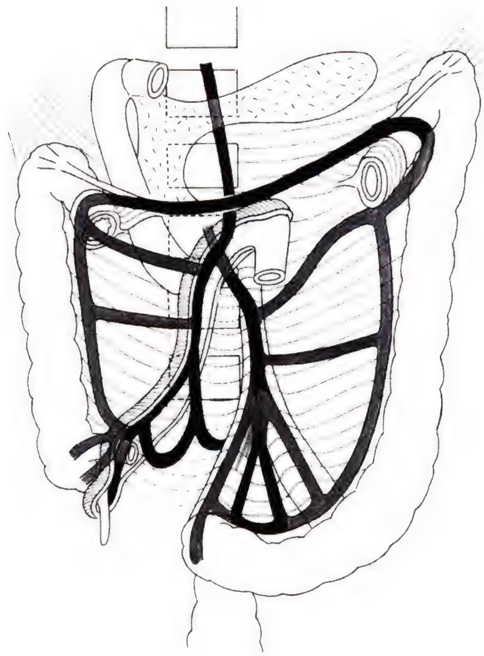


Fig. 2.6. Mesentery, mesocolon, and the colic arterial system; this is a superimposition of figures 2.4 and 2.5

The principal neurovascular and lymphatic channels (figs. 2.5 and 2.6): These superimpose themselves on this mesenteric figure eight. The mesenteric vessels pass through a space (central hiatus) created by the roots of the mesentery and the sigmoid mesocolon. Posteriorly, this space is bounded by the posterior parietal peritoneum and the vertebra. The root of the mesentery contains, in its middle part, the superior mesenteric artery, which vascularizes the right colon with its right collateral branches and the jejunum and ileum with its left collateral branches.

The right collaterals include: (1) the right colic artery, which follows the root of the transverse mesocolon and splits into two branches, the left and the right; the left goes through the transverse mesocolon, and the right goes through the ascending mesocolon; and (2) the ileocolic artery, which arises from the inferior end of the middle section of the mesentery and follows the inferior root. The terminal branches spread out at the cecum, appendix, and ileum. The ascending colic branch goes up within the ascending mesocolon.

The root of the transverse mesocolon contains the Riolan anastomosis, which is the anastomosis between the right colic artery (arising

from the superior mesenteric artery) and the ascending branch of the left colic artery (arising from the inferior mesenteric artery). The inferior mesenteric artery runs alongside the primary root of the sigmoid mesocolon and, after having passed in front of the aorta, ends at the rectum. It gives rise to two important collaterals: (1) the left colic artery, which travels in the ascending mesocolon and joins the Riolan anastomosis with its right branch; and (2) the left inferior colic artery, which eventually forms the trunks of the sigmoid arteries. These include the first (superior) sigmoid artery, which follows the secondary root; the second (middle) sigmoid artery, which goes into the mesocolon; and the third (inferior) sigmoid artery, which is situated in the inferior part of the sigmoid mesocolon near or in front of the inferior mesenteric artery, which follows the primary root.

Protection and Drainage

PROTECTION

Static: The close proximity between the attachments of the mesenteries and omenta and the large neurovascular and lymphatic structures is apparent from this anatomical description. It seems evident that these vital channels are placed in areas of relative fixity in order to grant them a static protection.

Dynamic: Our study of the gastrointestinal dynamic has demonstrated the existence of a set of movements such that during inhalation:

- The stomach curls up on itself in the frontal and sagittal planes and protects the vascular circles in the curvatures.
- The duodenum closes its loop around the large mesenteric vessels and its attachment to the pancreas.
- The jejunum and the ileum, even though their loops spread out laterally in opposite directions, overall collect themselves together, with the superior loops descending down upon the inferior loops, which do not move as far caudally.
- The colon closes its loop around the vascular distribution that it surrounds—on average, the transverse colon descends more than the ascending and the descending colons; these last two incline in opposite directions toward the midline of the body.

These collective movements, occurring as they do at the height of the intra-abdominal pressure generated during inhalation, produce a mechanical relaxation of the vascular, nervous, and lymphatic channels and thus seem, to provide a dynamic protection.

DRAINAGE

Physiologists have long demonstrated the important role of abdominal pressure in the venous circulation. In discussing these propulsive factors, Bonnet and Millet point out that the contraction of the diaphragm during inhalation compresses the visceral mass and the veins within it and contributes in an efficient way to the venous blood flow (*Manuel de physiologie*, p. 251). Bonnet and Millet also point out that thoracic inhalation, which creates negative pressure in the thorax, works with great efficiency on the blood within the veins and atrium, and with inhalation, the veins of the neck collapse (p. 253). This essential role that respiration plays in venous circulatory return also manifests itself directly in the subdiaphragmatic venous circulation. The effect of this respiratory factor is completed by the intra-abdominal compressive action of the diaphragm during inhalation.

Regarding the lymphatic circulation, Bonnet and Millet say that the rhythmic contraction of the intestinal peristalsis acts as a propulsive force (p. 258). The normal movements of the intestine combine with the increased abdominal pressure during inhalation and with the pressure of the diaphragm to aid in lymphatic circulation. This is necessary because the only lymphatic structures that contract are the walls of the large lymphatic trunks, which include the lymphatic duct and the cisterna chyli.

These well-established views of basic physiology clearly show the importance of the rhythmic variations of abdominal pressure. Our study supports this understanding by showing that the visceral dynamics allow for a mechanical relaxation of the tissues during inhalation when the intra-abdominal pressure increases. Conversely, there is a relative increase in tension during exhalation when intra-abdominal pressure diminishes. So beyond the protection afforded to the vascular, nervous, and lymphatic systems, this organization also seems to facilitate the venous and lymphatic drainage as well as neurovegetative stimulations favorable to homeostasis.

Thus, a disturbance of the dynamic could, by corollary, be at the origin of certain visceral pathologies. Minaire and Lambert state that the "influence of the vascular factors in the genesis of the acute gastric lesions is evident...." (*Physiologies humaine*, p. 276).

The Hemodynamic Reflex

The regulation of the arterial pressure is dependent upon the baroreceptor system, which consists of:

- The *ramus enteroseptivus nervi vagi* (efferent parasympathetic fibers from the cardiac branch of the vagus or nerve of Cyon-Ludwig), the receptive fibers of which are scattered beneath the endothelium in the aortic arch, traveling via the vagus nerve to the medullary bulb. This nerve is a depressor; its stimulation results in hypotension through cardiac moderation and through active vasodilation and inhibition of the vasoconstrictive tone.
- The *ramus sinus carotici* (carotid branch of the glossopharyngeal nerve or nerve of Hering) originates at the bifurcation of the common carotid artery as it divides into the internal and external carotid arteries. It is at the bifurcation that the baroreceptors of the carotid sinus are found. As an appendage, we find the carotid body (glomus caroticum), which contains chemoreceptors sensitive to the blood concentration of O_2 and CO_2. The nerve endings that constitute the ramus sinus carotici nerve travel to the medullary bulb by way of the glossopharyngeal nerve. This nerve is also inhibitory and is similar in its action to that of the ramus enteroseptivus nervi vagi, but the ramus sinus carotici is much more sensitive than the former.

Bonnet and Millet summarize the baroreceptor system by stating that pressure regulates pressure. They go on to say that the mechanism of such a regulation can only be via a reflex. The capacity for vasomotor change represents the major element of this response, and the reflexes of the ramus enteroseptivus nervi vagi and the ramus sinus carotici are its basis (*Manuel de physiologie*, pp. 223–229).

These two major baroreceptor mechanisms are only a part of a more

complex system. In 1912, a French physiologist, H. Stapfer noted that the integrity of the general circulation is dependent on the local abdominal circulation and that by changing the abdominal circulation, one changes the general circulation. The term, "dynamogen reflex," was used to describe this phenomenon (H. Stapfer, *Gynecologie*, Librairie Felix Alcan, 1912).

Limited by 19th-century knowledge, Stapfer's physiological explanation of this reflex is inaccurate. Yet it is true that a hemodynamic, "dynamogen" reflex does exist. Modern physiologists have been able to elaborate further the local controls and effects on blood circulation. Dr. Alan C. Burton has written that the carotid sinus and aortic receptors are not the only sensory receptor areas that participate in the depressor reflex. Dr. Burton suggested that there probably are a lot of "advanced posts," in particular, the corpuscles of Pacini, which are distributed in the visceral circulation within the mesentery. These control the local blood volume rather than the local blood pressure. The existence of pressors or baroreceptors participating in the depressor reflex have been observed, even in the most unexpected areas, such as at the level of the pancreas. The pathway followed by the baroreceptor information coming from the corpuscles of Pacini situated in the viscera is not established, but it probably travels via the vagus nerve. The carotid sinus and aortic areas represent the "headquarters" for the control of arterial pressure homeostasis, but there are also widespread minor stations (*Physiologie et biophysique de la circulation*, pp. 203–209).

Because it plays such an important role in homeostasis, it seems that this complex hemodynamic system must be involved in the genesis of visceral pathologies as well as in other distant pathologies.

HEMODYNAMIC TEST

It has been observed that changes in the abdominal circulation have effects on the arterial system as a whole, and we have found that this phenomenon can be used in a diagnostic maneuver. Under normal circumstances, it is possible to provoke a modification in the peripheral circulation by compressing one or another area of the abdomen. This modification can be felt in the peripheral pulses and expresses itself with a slowing down of the pulse. The mechanism of this response is

not known, but we assume that it is probably neurovegetative in character. While a slowing of the pulse is the typical normal reaction, we also sometimes see that the pulse does not slow when abdominal pressure is applied, but rather we see a rebound acceleration in the pulse when the pressure is released. In either case, there is some reaction in the pulse to abdominal pressure and this is considered normal.

In our clinical experience, we found that it was sometimes not possible to provoke this reflex; that is, even when we applied abdominal pressure, there was no reflex modification in the peripheral pulse. This lack of response could exist when pressure was applied to one or several abdominal areas or to the abdomen as a whole. *When no change in the pulse occurs, the area or areas pressed upon are thought of as dysfunctional—the neurovegetative response is not normal there. In this case, the hemodynamic test is said to be positive.*

Our conception of visceral somatic dysfunction is that it has as one of its components a disturbance in neurovegetative function (see chaps. 1 and 4). Therefore, it is consistent with our hypothesis that one way the somatic dysfunction of a viscera can be identified is by the inability to provoke the hemodynamic reflex when a pressure is applied on the area that corresponds to an organ. After normalization of the somatic dysfunction, we have found that it is then usually possible to reproduce the hemodynamic reflex on this area. Thus, this hemodynamic test can often be of great use in the treatment approach because it has the potential to identify the organ in dysfunction and to monitor the effects of the normalization.

(Note: The authors have done further research on this phenomenon of the hemodynamic reflex using Doppler echography in collaboration with the faculty of the University of Mons (Belgium). See "Afterword: Summary of Further Research—2000." -Ed.)

REVIEW OF GASTROINTESTINAL PHYSIOLOGY

MECHANICAL STIMULATIONS (FIG. 2.7)

Simple mechanical stimulations trigger and maintain several production factors that are essential to digestion. They include:

- Mastication stimulates the production of saliva by the oral glands as well as gastric secretion of pepsin and water.
- Distention of the esophagus stimulates the oral glands.
- Distention of the gastric fundus stimulates the production of pepsin, water, and hydrochloric acid. It also stimulates intrinsic factor, which is essential for the absorption of vitamin B12.
- Distention of the antrum stimulates the secretion of gastrin.
- Distention of the duodenum has the same effect as distention of the gastric fundus.

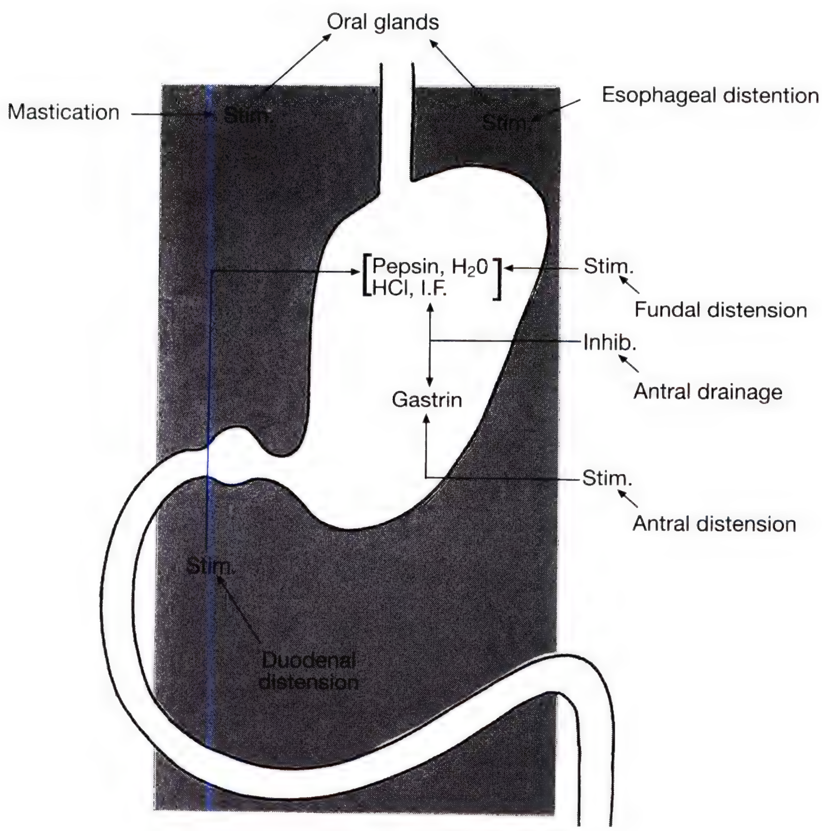


Fig. 2.7. Mechanical stimulations in digestion

CHEMICAL STIMULATIONS (FIG. 2.8)

The chemical stimulations are much more numerous and complex than the mechanical stimulations and will only be briefly reviewed here.

Stomach: Gastrin amplifies not only the antral production of hydrochloric acid, intrinsic factor, pepsin, and water, but also that of cholecystokinin in the duodenum. The hydrochloric acid inhibits the production of gastrin, but stimulates that of secretin in the duodenum.

Duodenum: Gastrin activates the formation of cholecystokinin, which is also determined by the concentration of lipids in the jejunum and by the concentration in the bulb of carbohydrates and hydrochloric acid. Cholecystokinin stimulates the action of the biliary salts by provoking a contraction of the gallbladder simultaneous with an opening of the sphincter of the hepatopancreatic ampulla. It favors the production of insulin, bicarbonates, and glucagon in the pancreas. Cholecystokinin also inhibits the action of the bulbar acidity and the antral secretions.

Secretin, stimulated by the appearance of hydrochloric acid, reduces the formation of acid. Secretin neutralizes the acid's destructive effects in the bulb by influencing the secretion by the pancreas of bicarbonates. These salts react with hydrochloric acid and sodium to form sodium chloride and carbonic acid. The latter, as it circulates, becomes water and carbon dioxide, eliminated by the lungs. While waiting for the action of the bicarbonates to be effective, the duodenal glands, by the secretion of great quantities of mucus, reduce the digestive action of pepsin and hydrochloric acid on the mucous membrane. Secretin also activates insulin and prevents the delivery of glucagon.

In addition, hypertonic glucose solutions, acidity in the bulb, and lipids in the jejunum limit the formation of hydrochloric acid and diminish gastric motricity. This gastric mixing slows the movement of the lipids, which are then not evacuated from the stomach until five or six hours later. In the event of dysfunctional motricity, the lipids, proteins, and carbohydrates are evacuated all at the same time, thus disturbing the digestive function.

Enterokinase, a duodenal hormone, when transformed into trypsin, inhibits the action of the biliary salts, contrary to the action of cholecystokinin. The latter, in weak concentration, stimulates the action of

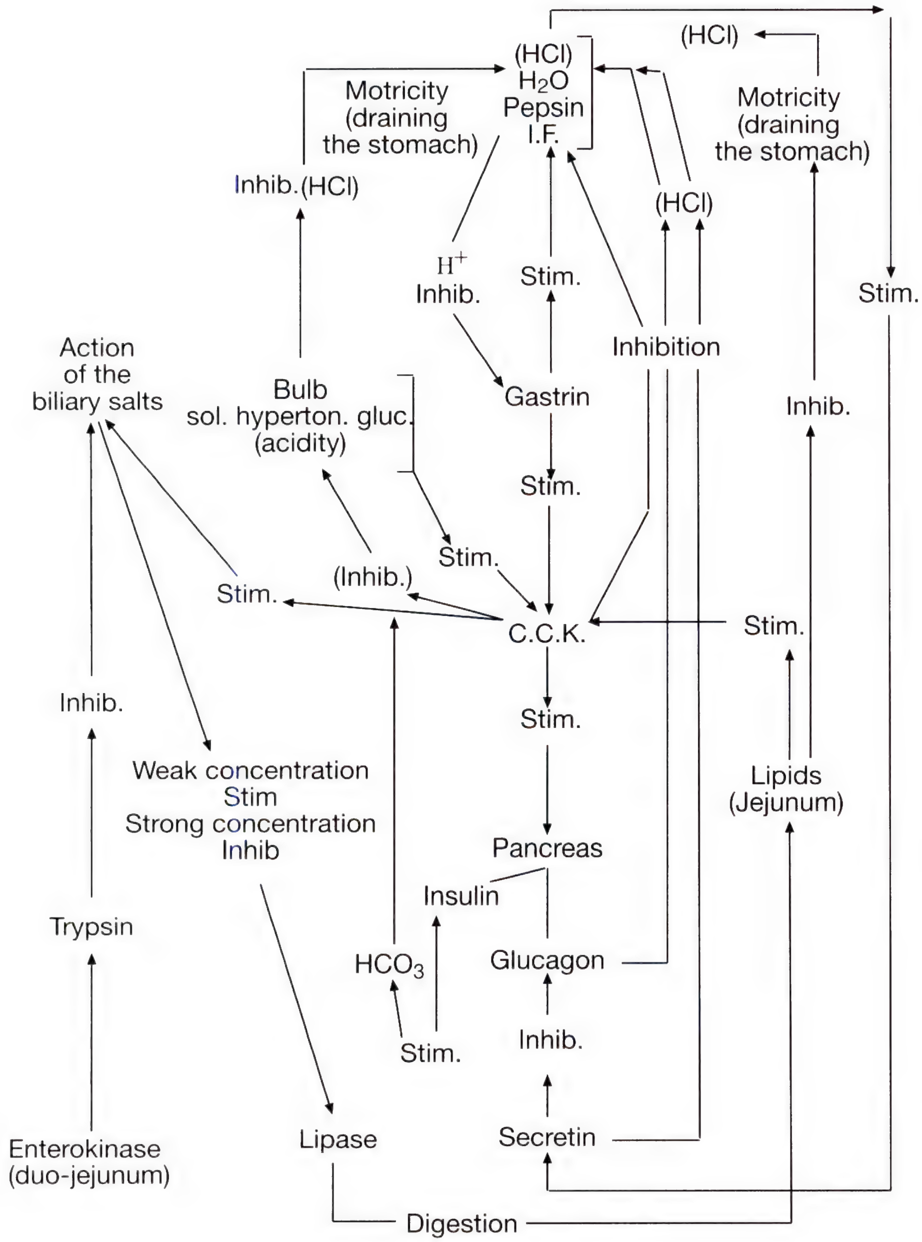


Fig. 2.8. Chemical stimulations in digestion

pancreatic lipase and, in strong concentration, inhibits it. All these hormones are carried by the blood to the target organs.

Jejunum and ileum (mesenterial intestine): The jejunum and ileum carry out the final stages of digestion by secreting numerous enzymes. The type of nutritional element present provokes the appearance of a hormone that then controls which kind of enzyme will be secreted. Maltase, sucrase, and lactase complete the transformation of the carbohydrates into monosaccharides. Peptidase digests proteins, and lipase transforms the lipids.

Another essential function of the mesenterial intestine is to reabsorb a significant quantity of liquid. Eight liters of various secretions, including gastric, hepatic, pancreatic, salivary, and so forth, are reabsorbed daily before the 500 remaining milliliters arrive with the chyme in the colon. These intestinal secretions are controlled by intramural reflexes excited by distention of the mucous membrane due to the passage of the chyme.

Colon: Having no digestive function, the colon simply secretes mucus, which provides the necessary lubrication for the passage of feces. The mucus also protects the mucous membrane from the enzymes coming from the small intestine. The right side of the colon plays a role in the reabsorption of liquids.

CLINICAL CORRELATIONS

Fascial Disturbances and Functional Problems

The following review gives examples of the types of clinical problems seen when a given fascial area is disturbed.

The area of the stomach is mainly associated with gastritis, hiatal hernia, postprandial heaviness, and nausea.

The area of the duodenum generally is associated with heartburn, pains late after meals, and functional signs of trouble with the pancreas, which include an intolerance of meat and fat, the need for sugar, hunger with "sudden tiredness" at the end of mornings, and so on.

The review of digestive physiology in the preceding section on "Chemical Stimulations" reminds us of the intense activity that goes on in the duodenum, which acts as a large chemical factory to regulate

many functions of the digestive system. In our osteopathic practice, we frequently note that the "normalization" of the duodenum can have as great an effect on certain functional pathologies of the gastrointestinal tract as does the normalization of the liver and pancreas.

The area of the jejunum and ileum is associated with distention of the stomach and diffuse pains of the abdomen.

The area of the right colon corresponds, in most cases, to diarrhea and right-sided colitis, with painful points found in the fixed area.

The area of the left colon corresponds principally with constipation and left-sided colitis.

Constipation: With *constipation*, besides fixation of the left colon, we often note a fixation of the right colic flexure. In the case of *alternating constipation and diarrhea*, the cecum is generally implicated for the diarrhea and the left colon for the constipation.

chapter **3**

Summary of the Visceral Dynamics

This chapter presents a summary of how, according to our study, the organs move. We will describe only the statistically clear, consistent dynamics of the movements of each organ. We have left out the less clear shifts because we did not take them into account for the normalizations. A detailed analysis of the results of our research is presented in chapters 9 and 10, and these lesser movements are reported there. In order to draw a clearer picture, some material from those chapters is repeated here.

THE GASTROINTESTINAL TRACT

During inhalation, the further away from the diaphragm an organ is, the less the influence of the diaphragm's vertical pressure is felt. Moreover, for the organs furthest away from the diaphragm, the transverse shifts in the frontal plane disappear.

FRONTAL PLANE (FIG. 3.1)

- In the frontal plane, during inhalation, all the levels descend.
- The *gastric fundus* makes a movement from above to below which is greater than that of the *body of the stomach*, resulting in the stomach folding on itself. Simultaneously, the gastric fundus inclines to the left, and the body of the stomach inclines to the right.
    - There is a three times greater descent of the gastric fundus than of the body of the stomach. Thus, the stomach shortens in its long axis, "curling up" on itself during inhalation. Because the inclination of the body of the stomach and the gastric fundus occur in opposite directions, both in the frontal and sagittal planes, a "torsion" of the stomach is created.

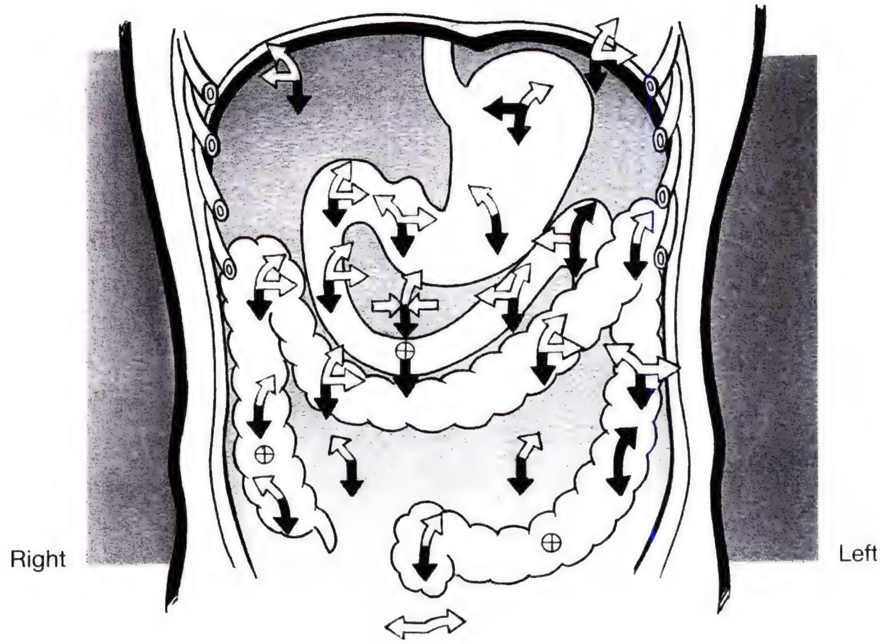


Fig. 3.1. Gastrointestinal tract: frontal plane

- The first and second parts of the *duodenum* tend to shift transversely to the left, whereas the fourth part of the duodenum and the duodenojejunal angle tend to shift to the right. Thus, the duodenum closes its loop, with the third part of the duodenum playing the role of a pivot point between the proximal and distal segments. Simultaneously, the duodenal mass inclines to the left.
  - During inhalation, the duodenum makes a kind of torsional movement on itself in the sagittal and frontal planes. We would suggest an important role for the third part of the duodenum in this movement. The root of the mesentery, which crosses the third part of the duodenum vertically, seems to confer on the third part of the duodenum a relative fixity and a faculty for "adaptation." Our study also reveals that the duodenojejunal angle is far from being fixed, as has been generally assumed.
- The *jejunum* and the *ileum* (*mesenterial intestine*) spread out laterally toward the ascending and descending colons, which in turn incline toward the midline and meet the jejunum and ileum. These observed

movements lend support to the role, which has long been attributed to the mesenterial intestine, of being a distributor of pressure.

- The *cecum* inclines to the right. The *right colic flexure*, the *transverse colon*, the *left colic flexure*, and the *iliac colon* incline to the left. The iliac colon (the part of the colon lying between the iliac crest and the pelvic inlet) tilts toward the exterior around a fixed point defined by the meeting point of the secondary root of the sigmoid mesocolon and the descending mesocolon. Moreover, the right colic flexure, the transverse colon, and the descending colon shift transversely to the left. The flexures and the transverse segment descend vertically in a more perceptible way than the ascending and descending colons. The colon in its entirety tends to close its loop.

  - As has been previously described by other authors, the *colon* also seems to make a global movement of rotation clockwise. This is supported by our observations, as we noted a greater descent of the left colic flexure and descending colon than of the right colic flexure and ascending colon. Most of the axes incline from the right to the left. In short, we can say that during inhalation, the colon descends, advances, and tends to incline to the front. Moreover, in the frontal plane, it seems to make a global clockwise rotation movement while at the same time its ascending and descending segments are drawing closer together.

  - The dynamic of the *ascending colon* organizes itself and pivots around a relatively fixed point situated at its union with the cecum.

  - The *ascending colon* and the *descending colon* tilt toward the interior during inhalation—coming to meet the flexures of the mesenterial intestine (jejunum and ileum), which spread out to the exterior—thereby securing a counterpressure and a distribution of the intra-abdominal pressure.

  - The dynamic of the *iliac colon* organizes itself around a pivot point situated at its union with the first portion of the sigmoid. In so doing, it shows a similarity in function to the ascending colon, which pivots around a relatively fixed point at its union with the cecum.

SAGITTAL PLANE (FIG. 3.2)

- In the sagittal plane, all levels move downward, forward, and incline from back to front.

There are *four exceptions* to this observed direction of *inclination*. The parts which tend to incline in the opposite direction, from the front toward the back, are the *gastric fundus* (as a result, the stomach curls up in all planes), the *cecum*, and the *left colic flexure*. The *right colic flexure* has no defined tendency.

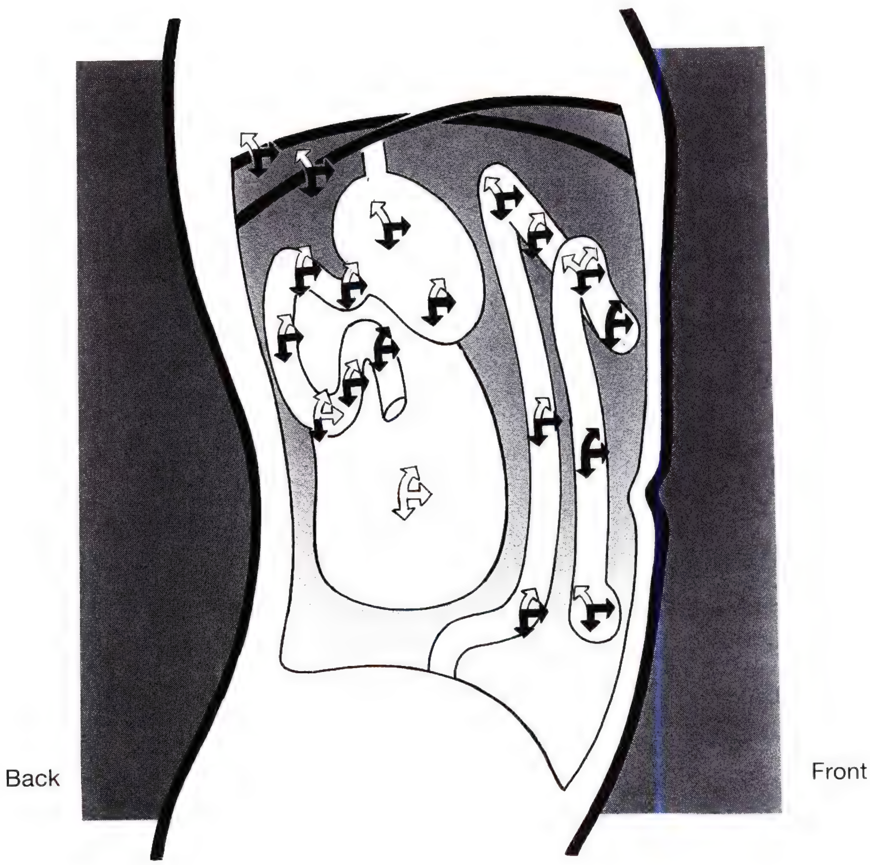


Fig. 3.2. Gastrointestinal tract: sagittal plane

THE LIVER, KIDNEYS, PANCREAS, AND SPLEEN

FRONTAL PLANE (FIG. 3.3)

- In the frontal plane, during inhalation, the *liver*, *kidneys*, *pancreas*, and *spleen* show a vertical shift downward, and, in addition, the left kidney and the spleen show an inclination to the right.

SAGITTAL PLANE (FIGS. 3.4 AND 3.5)

- In the sagittal plane, during inhalation, we find the same downward vertical movement seen in the frontal plane.
- Simultaneously, the following occurs:
  - The *kidneys* shift forward, and in addition to this, their apexes show a tendency toward a posterior inclination at the end of the respiratory movement.
  - The *spleen* tends to move forward.
  - The *pancreas* tends to incline posteriorly at its apex and shift backward *(Note: The examination of the pancreas encountered the technical limits of the echographic imagery and therefore might not be fully accurate).*

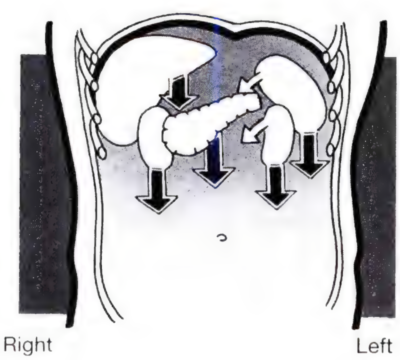


Fig. 3.3. Liver, spleen, kidneys, and pancreas: frontal plane

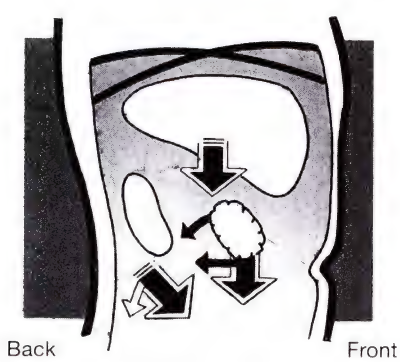


Fig. 3.4. Liver, right kidney, and pancreas: sagittal plane

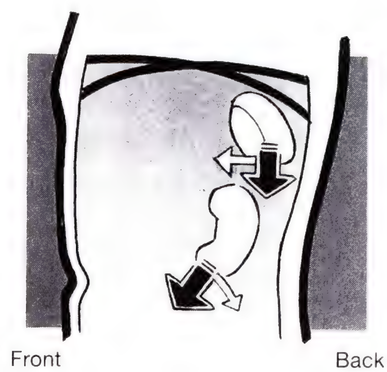


Fig. 3.5. Spleen and left kidney: sagittal plane

chapter **4**

Foundations for the Normalizations

In this chapter, we will discuss the anatomicophysiological and philosophical foundations of our unique program of visceral normalization, which is based on our precise observations of the visceral dynamics and on our understanding of the functional anatomy. One of the key discussions will be fascial anatomy and function and the role that fascia plays in the health and homeostasis of the organs. We will also describe the basic principles of diagnosis and treatment in our approach to visceral normalization; the normalizations themselves are described in chapter 6.

THE FASCIA

The fascial anatomy we are going to focus on here is that related to the viscera. For a more detailed description of fascial anatomy, which is very complex, we refer the interested reader to standard texts of anatomy and to several osteopathic works on the subject, particularly *Les fasciae en médecine ostéopathique* by Gabarel and Roques. Summarized below are some of the important ideas that relate to our work.

Embryology (fig. 4.1)

This embryologic discussion is based on the writings of Gabarel and Roques (*Les fasciae*, pp. 20–27).

All fascia is derived from the primitive embryonic layer, the mesenchyme. The thoracic, abdominal, and pelvic organs that arise from the endodermic tissue (which include the epithelia of the gastrointestinal tract, respiratory tract, and the bladder; and the glandular structures and organs) are surrounded by the mesoderm. The mesoderm also gives rise to the serous linings and their derivatives—mesenteries, ligaments, and omenta—as well as the interstitial mesenchymal tissue.

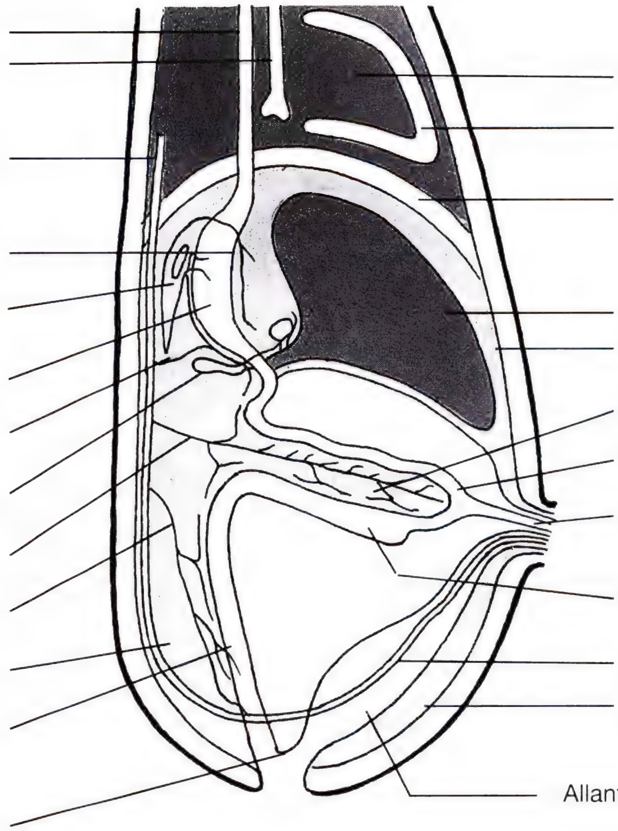


Fig. 4.1. Embryology of the abdominal cavity (according to Rouvière)

This mesoderm will later differentiate itself, forming:

- *Splanchnopleure*: The splanchnic (visceral) mesoderm and the embryonic endoderm form the wall of the primitive gut, including the muscles and the connective tissue coverings (tunics) of the viscera.

- *Somatopleure*: The somatic (parietal) mesoderm and the overlying embryonic ectoderm form the embryonic body wall, including the lateral and vertebral muscular walls of the trunk.

We can see that there is an association between the embryonic alimentary canal and the mesenteries of the peritoneum, which links the canal to the wall at a very early stage in development. Therefore, even at the embryological level, there is evidence of a *somatovisceral fascial unity*.

Anatomy

Gabarel and Roques comment on the classification of the fascia as follows: "The fascial system is a continuous system, even though it has been classified as being organized on three levels, each in relation to and coordinated with each other, including the superficial, intermediate and deep fascias" (*Les fasciae*, pp. 29, 33). Rouvière, in his book *Anatomie humaine* describes the fascial anatomy (Vol. II, p. 287). He points out that the *peritoneum* has, like all other serous membranes: (1) a *parietal* layer, which is called the parietal peritoneum and is applied on the walls of the abdominal and pelvic cavities; the parietal layer is covered over its entire surface by a cellular layer of connective tissue called the fascia propria and is often covered by adipose tissue; (2) a *visceral* layer, or visceral peritoneum, which constitutes the serous covering of the abdominal and pelvic organs; and (3) the *membranous folds* which link the parietal peritoneum to the visceral peritoneum.

These membranous folds sheathe the neurovascular pedicles, which travel from the abdominal wall to the organs and are wrapped by serosa. Each of the folds is composed of two layers, separated from each other by a thin lamina of connective and adipose (adipocellular) tissue enclosing the vessels and nerves. The serous layers, coming from the parietal peritoneum, advance into the abdominopelvic cavity and become continuous with the visceral peritoneum, covering both sides of the connecting tissue and neurovascular structures, and reach their intended organ.

The visceral peritoneum, the parietal peritoneum, the mesenteries, the omenta, and the ligaments are *all part of one membrane*, which is continuous everywhere and which marks the limits of a potential cavity, the peritoneal cavity.

In *Les fasciae*, Gabarel and Roques state: "In conclusion, the connective tissue derived from the mesenchyme is encountered everywhere in the human body. It varies in quantity in different places and under different circumstances. The main portion of the connective tissue serves a support role and corresponds to our definition of fascial tissue. It has a method of distribution and organizational plan which are totally precise, induced by the requirements of organogenesis" (p. 158).

Gabarel and Roques go on to make the point that in the musculoskeletal (parietal) system, the fascial chains organize themselves in accord with the function of the musculoskeletal system. This allows the specific continuity of muscular groups (better termed, "muscular chains") and the articular elements (ligaments and capsules) to interact, in the sense of having a coherent anatomical organization and a coordinated function. Gabarel and Roques say that it is exactly the same for the visceral system, where one can consider that specific chains exist, which include the ligaments and the mesenteries, the capsules of the organs, the tunics (external connective tissue layers) of the organs, and the intra-organ divisions where such divisions exist.

Therefore, the fascia constitutes, in an indisputable way, a complete wholeness which shows no break in continuity throughout its entire distribution—from one end of the body to the other and from the surface to the depth.

Pathology

Because of its anatomy and physiology, the fascia will reflect and demonstrate local and regional pathological changes. Gabarel and Roques note that in response to certain exogenous or endogenous insults, fascia can potentially develop (*Les fasciae*, p. 158):

- a thickening (for example, adipose)
- a hyperplasia from being stressed beyond its mechanical norms
- a hardening fibrosis
- condensations, nodules, or cysts
- localized strap-like retractions
- adherencies during scar formation

They point out that these pathological modifications can obviously have repercussions on the function of the fascia. Because the fascial tissues contain and support the neurological and vascular elements, it can be presumed that the local and regional neurological and circulatory function will show the effects of all fascial disturbances.

Gabarel and Roques go on to describe specific pathological changes. They state that: "When an irritation or an infection appears at a certain point within a tissue or an organ, the fascias, being part of the composition of and surrounding this organ or tissue (i.e. basal laminas, aponeuroses, capsules, sheaths, etcetera), are at the center of a series of phenomena destined to fight against this irritation or infection" (p. 175).

In regard to scar tissue, Gabarel and Roques explain that as part of the "reaction of the connective tissue cells in the granulation stage, the weft is enriched by various fibers, reticulin and collagen. If the reabsorption of the fibers cannot then be accomplished because of, for example, a mechanical problem, the scar becomes fibrous and can, if the disturbance is significant, lead to a local sclerosis with many adherencies" (pp. 176–177).

BASIC PRINCIPLES OF OUR VISCERAL APPROACH

The unity of fascia: Even if individual fascias are named differently according to their anatomic localization, they are of one and the same tissue. They are one fascia, with no break in continuity from head to toe and from the skin to the very depth of the being. This vast web of fascia, with its adaptability, expresses the local and regional organ disturbances. Because of the continuity in the fascia, we can hypothesize that the superficial fascia will reflect the disturbance of the underlying organ—that is, the superficial layer of the abdomen, being composed of fascia, will show the stresses at different places in relation to a restricted organ in the abdomen.

Systematic visceral dynamics: We have shown that there are organized visceral dynamics, which are repeated, according to the respiratory rhythm imposed by the diaphragm, approximately 20,000 times a day. These rhythmic dynamics of the abdominal organs reflect themselves within the fascial elements, which are so dense at this level. We believe that these systematic dynamics influence the quality of the connecting fascia. If they are functioning well, the neurological and vascular elements contained in the fascia will maintain their integrity and assure good visceral homeostasis. It also follows that a disturbance in the visceral dynamics could induce a mechanical irritation and a fascial fibrosis, resulting in a pathological cycle maintaining the disturbance.

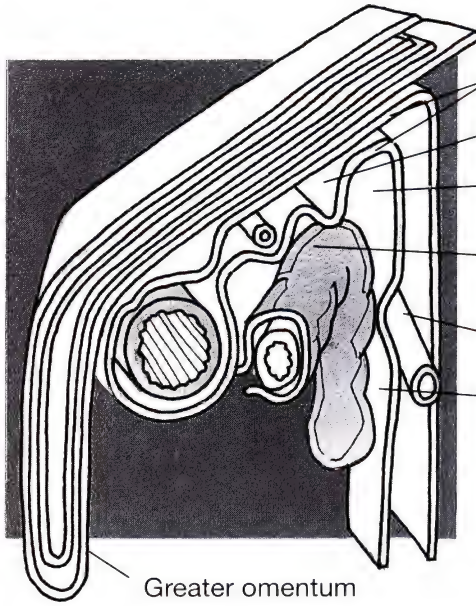
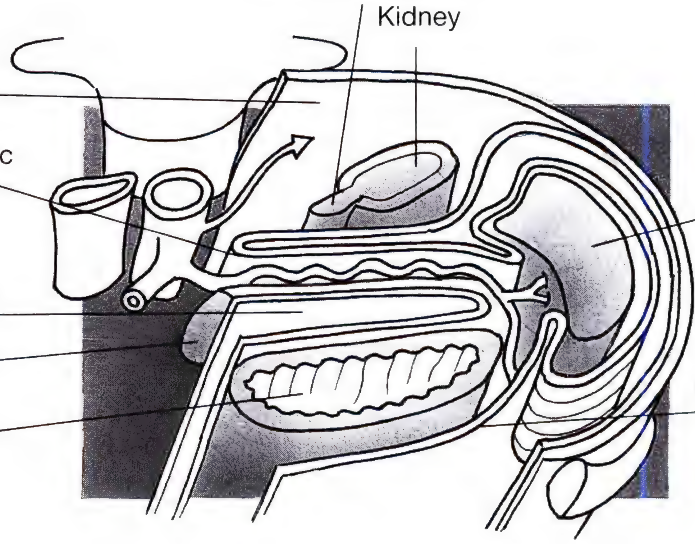


Fig. 4.2. Palpation of the organ or its environment? (according to Perlemuter and Waligora)



The fascial environment of the organ: Given these understandings, we believe we are able to perceive, without deep palpation, the state of the organ within its fascial environment. It is not literally possible to palpate a given organ—the anatomy does not allow us to grasp or have direct contact with an organ. We cannot palpate a kidney, intestine, spleen, or liver; instead, we palpate the fascial environment of the organ (fig. 4.2).

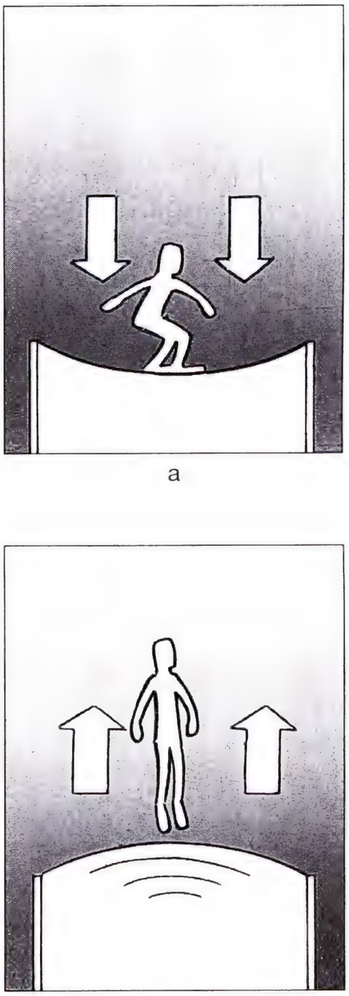
Given our view of the fascial continuity from the surface to the depth, there is also no need to try to palpate, even if one could, the deep fascia that directly surrounds an organ. If all visceral disturbances have repercussions that occur within the neighboring fascial tissues, a light perpendicular palpation over the organ is sufficient. Therefore, we speak of palpation of the "hepatic area" or the "renal area," not of the liver or kidney per se.

The palpatory method of "fascial induction": As for the palpatory method, normal mobile tissue presents a supple texture that, when lightly pressed, gives a kind of bounce. We can compare it to a trampoline (fig. 4.3), which stores the energy imparted from above downward by the jumper (a) and then restores this energy from below upward, sending the jumper back up again (b). In applying this analogy to fascial tissue that has been affected by the disturbance of the organ which it contains, the tissue will not restore the energy; the stiffness of its texture prevents it from doing so. The osteopath can take advantage of this in the diagnostic approach to the abdominal organs.

This method allows one to recognize and to select, in an easy, simple and precise way, the disturbed organ(s), avoiding the sometimes uncomfortable and ticklish problem of deep abdominal palpation that can be a stumbling block in other visceral approaches. (We describe the diagnostic method more fully later in this chapter.)

Throughout this work, we will use the term "fascial induction" to describe this palpation method. In this context, the term only means: *to induce manually a global fascial shift in the investigated area in order to judge the state of the fascia in that place*. There is no implication here of "motility."

Visceral osteopathy as normalization of the fascial environment: Our viewpoint is that the visceral osteopathic normalization is first of all a fascial normalization and not directly a normalization of the



a

b

Fig. 4.3. Normal tissue response to pressure

organ. “To normalize an organ” is an expression which seems inappropriate to us; we believe the term “normalization of the fascial environment of the organ,” or “normalization of the area of the organ,” to be more satisfactory.

Goal of treatment: The visceral normalizations in osteopathic medicine have the aim to liberate, by manual techniques, all tension restraining the original diaphragmatic dynamic imposed on the intra-abdominal organs and to restore the plasticity and elasticity of those organs in order to maintain their homeostasis. Visceral normalizations are specific manual techniques that act on the dynamics of an organ as well as on its fascia. Their aim is to restore the homeostasis within the environment of the organ (the fascia); the organ itself; and the circulatory, lymphatic, and neurovegetative systems, which regulate and are affected by the visceral system. It is also understood that these visceral normalizations are integrated into a total treatment approach for each case that is treated.

Features of our approach: The approach we are presenting is that of using *a precise gesture aiming to reproduce on the superficial fascia the dynamics of the organ*. The goal of this maneuver is to reinduce within the organ the normal dynamics, which we believe is possible because of the fascial continuity that has been described.

This method of visceral normalization depends on a precise knowledge of the visceral dynamics. It is done, as the patient lies supine, by applying stretching movements to the surface in rhythmic conjunction with the diaphragmatic respiration. These movements are carried out in a frontal plane, using the longitudinal and transverse vectors based on the dynamics of the organ to be normalized. The effects of the stretching are transmitted by way of the fascial continuum—by the intimate connection of the fascial elements to the organ.

The normalizations we present require precision, but are easy to apply. The technique is simple, quickly effective, and minimally invasive, allowing us to respect painful or sensitive abdomens and to avoid traumatizing sick tissues by an overly deep approach. A deep or forceful intervention can also activate reflexes and bring about the opposite effect of the one desired. Another positive feature of this method is that it is possible to establish immediately whether or not there has been an effect, especially by using the hemodynamic test (see p. 45).

THE TREATMENT'S MECHANISM OF ACTION

These fascial-visceral normalizations seem to work in many ways. There is a mechanical action on the fascia and thus on its components, including cells (fibroblasts, adipocytes, macrophages, etcetera), fibrous proteins (collagen, reticulin, elastin), and the extracellular matrix (water, macromolecules, etcetera). These components are responsible, to various degrees, for the elasticity, plasticity, resistance, and viscosity of the fascia as well as for its physicochemical, electrical, metabolic, and neurophysiological balance. As Gabarel and Roques suggest:

> The fascial techniques function by normalizing the tensions, compressions, and deformations that the components of the extracellular matrix undergo. The extracellular matrix, site of the origin of fibrous and sclerosing phenomena, includes the ground substance of collagen and elastin fibers. The fascial techniques do this by facilitating the depolymerization of the glycosaminoglycans, making for a more fluid and permeable extracellular matrix, and balancing the relation between the matrix and the fibers. In this way, these techniques can make possible a free transmission and circulation of the many signals, which allow, amongst other things, the coordination of the activities of the different cells and tissues as well as the coherence of the tissue and cellular functioning. (*Les fasciae*, p. 181)

These homeostatic phenomena can be transmitted from the container to the content—from the fascia to the organ—the fascia extending from the surface to the depth and surrounding the organs in a continuity of perfect wholeness. The fascia, liberated from its tensions, no longer constrains the organs; the restrictions are reduced, and the organs are able to go back to the state essential for their vital dynamics. At the same time, we believe the vessels and nerves in the peritoneal folds, going to and coming from the organs, regain their nourishing capacity.

Thus, the organ does not need to be directly manipulated. Having received the manual dynamic input transmitted by the fascial continuum, the organ is now freed from surrounding mechanical constraints. The organ can then fall back under the action of the diaphragmatic piston, shift to its original state, and regain its circulatory, lymphatic, neurovegetative, physicochemical, and secretory integrity. If this occurs, we can then say that the organ is now normalized.

The Normalization Method

In the normalizations, we often approach several organ areas with one single maneuver. In these cases it seems best to adopt a global approach for two reasons. One is our view of the mesentery and the visceral ligamentary system as making an interdependent wholeness out of the elements of the gastrointestinal tract. The other reason is that clinical observation shows that there can be great variation among patients regarding the position of their abdominal organs. We saw one patient in whom there was no right colic flexure and the ascending colon went obliquely toward the left colic flexure, making for an elongated transverse segment. In another patient, both colic flexures were situated under the left diaphragmatic arch. In yet another, the loop of the transverse colon dropped into the iliac fossa.

Contraindications for the normalizations (this list is not exhaustive):

- cancer
- aneurysm of the aorta
- gallbladder or bile duct stones
- an acute abdomen (peritonitis, appendicitis, pancreatitis, perforation of the stomach, ruptured spleen, etcetera)

DIAGNOSIS

The *fascial induction test* is the fundamental method used to determine the areas to be addressed in the normalizations. The fascial induction involves inducing, with the help of both hands, either a light transverse motion or a motion from the surface toward the depth (figs. 4.4 and 4.5). The tissue response we are looking for is one of free and harmonious movement. When an abdominal area does not respond to the induction, one can consider that it is disturbed in its dynamics (see p. 41 for an explanation of this principle).

Having identified disturbed dynamics, we also use the fascial induction method to ascertain if the organ has a dysfunction in inhalation or exhalation. To do this, we lay our hands on the abdomen in the organ area to be evaluated (as described for the normalization in Part 2). We then perform the fascial induction by stretching the tissue alternately in the direction for inhalation and then exhalation. If we get a response in the inhalation direction but not in the exhalation direction,

Fig. 4.4. Fascial induction—transverse shift

Fig. 4.5. Fascial induction—shift from the surface toward the depth

we say that the organ has an inhalation dysfunction. If we get the opposite response—a movement in the exhalation direction—we conclude that the organ has an exhalation dysfunction.

The *hemodynamic test* is another tool we use in diagnosis (fig. 4.6). This is done by applying to each area to be diagnosed a pressure from the surface toward the depth, while at the same time the practitioner monitors with the other hand the reaction of the radial pulse. If the fascial area is disturbed, the pulse remains unchanged, and the test is said to be positive.

A slowing of the pulse is the typical normal reaction. However, we sometimes see that the pulse does not slow when abdominal pressure is applied, but we see a rebound acceleration in the pulse when the pressure is released. In either case, under normal circumstances, there is some reaction in the pulse to abdominal pressure. (See p. 21 for an explanation of this principle.)

Fig. 4.6.
The hemodynamic test

Our palpation of the visceral system has as its primary objective identifying a somatic dysfunction of the viscera. However, even though they are not described here, other parts of the physical examination—such as inspection of the abdomen and skin, assessment of abdominal tension, percussion, succussion, and study of the dermatomes—remain valuable.

THE PROCEDURE

The direction of the described maneuvers is always given in relation to the patient, who is lying supine with legs bent or stretched out if the abdominal tension allows it. The patient is asked to take deeper breaths than normal.

This type of normalization is a *direct* technique. The maneuver is initiated during the respiratory cycle opposite to that of the dysfunction—in other words, the respiratory cycle in the direction of the normalization maneuver. In treating an exhalation dysfunction, the practitioner initiates the maneuver during inhalation and reproduces the dynamic in the inhalation direction. Then the obtained position is maintained during exhalation. At the end of the normalization, the practitioner may accompany the return in the exhalation direction. The maneuver for an inhalation dysfunction would be initiated in exhalation and maintained during inhalation.

When there is a condition that limits the patient's ability to cooperate with deep breathing (cardiac, asthmatic, infancy, etcetera), one must work with a normal amplitude of breath. It requires a more sensitive touch, but a trained practitioner can easily perceive the fascial responses.

As a general rule, four or five maneuvers will be made for each patient. The specific number will be determined by repeating the fascial induction test, which will indicate when the fluidity of movement of the tissues has been restored. It is the same as when treating the body, one can test articular liberation immediately after normalization. This return toward the normal physiological dynamics should be perceived during the session. The hemodynamic test may also be used to confirm whether there has been an effect from the normalization.

During the clinical part of our research, we always gave the visceral treatments as part of the treatment of the whole person. The visceral treatments were given in two sessions at 15-day intervals. In our clinical study, carried out on thousands of patients, we found that improvement occurred most often after the second session.

part two

The Normalizations

chapter **5**

Key Points for the Normalizations

In this chapter, we will summarize a number of the key points related to the visceral normalizations. These points have been taken from Part 1 of this book, where they are each discussed at greater length.

PRINCIPLES

- *The systematic visceral dynamics*: There are organized visceral dynamics, which are repeated, according to the respiratory rhythm imposed by the diaphragm, approximately 20,000 times a day. We believe that these systematic dynamics influence the quality of the connecting fascia and the organs.
- *The unity of fascia*: The fascia constitutes a complete wholeness which shows no break in continuity throughout its entire distribution—from one end of the body to the other and from the surface to the depth. Because of this continuity in the fascia, we believe the superficial fascia has the capacity to reflect the disturbance of the underlying organ. This means that, without using deep palpation, we can assess the state of the organ and correct the disturbances found.
- *Treatment of the whole person*: It is understood that these visceral normalizations are to be integrated into a total treatment program established for the whole patient.

THE VISCERAL OSTEOPATHIC NORMALIZATIONS

- This method depends on a detailed knowledge of the visceral dynamics.
- The maneuver is a precise gesture that reproduces on the superficial fascia the dynamics of the organ, with the goal of reinducing within the organ the normal dynamics.
- The specific manual techniques aim to act on the dynamics of an organ as well as on its fascia. The aim is to restore the homeostasis within:
    - the environment of the organ (the fascia)
    - the organ itself
    - the circulatory, lymphatic, and neurovegetative systems, which regulate and are affected by the visceral system
- We often approach several organ areas with one single maneuver. We adopt a global approach for two reasons:
    - The mesentery and the visceral ligamentary system make an interdependent wholeness out of the elements of the gastrointestinal tract;
    - Clinical observation shows a great variation among patients regarding the position of their abdominal organs.
- *Contraindications* for the normalizations (the following list is not exhaustive):
    - cancer
    - aneurysm of the aorta
    - gallbladder or bile duct stones
    - an acute abdomen (peritonitis, appendicitis, pancreatitis, perforation of the stomach, ruptured spleen, etcetera)

PALPATION

- We believe we are able to perceive, without deep palpation, the state of the organ within its fascial environment. If all visceral disturbances have repercussions that occur within the associated fascial tissues, a light perpendicular palpation over the organ is sufficient. Therefore, we speak of palpation of the hepatic *area* or the renal *area*, not of the liver or kidney per se.
- "Fascial induction" is the term used to describe this palpation method. In this context, the term means: to induce manually a global fascial shift in the investigated area in order to judge the state of the fascia in that place.

DIAGNOSIS

- The *fascial induction test* is used to ascertain the areas to be addressed in the normalization and whether the organ has a dysfunction in inhalation or exhalation. The dysfunction is named for the direction in which the tissues are free to move (see p. 44).
- The *hemodynamic test* is used as a tool to identify areas of dysfunction in the abdomen and to help assess when the normalization has taken place (see p. 45).

THE PROCEDURE

- The direction of the described maneuvers is always given in relation to the patient.
- The patient is lying supine with legs bent or stretched out if the abdominal tension allows it.
- The patient is asked to take deeper breaths than normal.
- The maneuver is performed by applying stretching movements to the surface in rhythmic conjunction with the diaphragmatic respiration.
- This is a direct technique. The stretching movements are made in the direction of the restriction, the direction into which the tissues are not able to freely move.

- The maneuver is initiated during the respiratory cycle opposite to that of the dysfunction—in other words, the respiratory cycle in the direction of the restriction and the normalization maneuver.
  - In treating an exhalation dysfunction, the practitioner reproduces the dynamic in the inhalation direction described in this study. Then the obtained position is maintained during exhalation. At the end of the normalization, the practitioner may accompany the return in the exhalation direction. The maneuver for an inhalation dysfunction would be initiated in exhalation and maintained during inhalation.
  - Four or five maneuvers will be made for each patient, as a general rule.
  - The specific number will be determined by repeating the fascial induction test, which will indicate when the fluidity of movement of the tissues has been restored. This return to the physiological dynamics should be perceived during the session.

TREATMENT SEQUENCE

- Before the visceral normalization:
  - Verify that there is good functioning of the diaphragm. This is done by checking the related somatic areas (see p. 109).
  - Carry out the fascial induction test to determine if a dysfunction is present and whether it is in inhalation or exhalation.
  - Carry out the hemodynamic test to determine if a disturbance is present.
- Perform the normalization maneuver(s).
- After the visceral normalization:
  - Repeat the fascial induction and the hemodynamic test. This enables the practitioner to help confirm that the organ and its fascial environment have returned to their normal dynamics.

chapter **6**

The Visceral Normalizations

In this chapter, we present the normalizations we have developed to treat the dysfunctions found in the abdominal viscera. The normalizations are based on the dynamics identified in our research study. Included in the descriptions is a general review of each organ's dynamics; for details of the dynamics, see chapter 3, and for the statistical findings, see our research results in chapters 9 and 10.

NORMALIZATION FOR THE AREA OF THE STOMACH

Review of dynamics:

- In the frontal plane, during inhalation, the stomach descends.
  - The gastric fundus makes a movement from above to below which is greater than that of the body of the stomach, resulting in the stomach "curling up" on itself.
  - Simultaneously, the gastric fundus inclines to the left and the body of the stomach inclines to the right, creating a "torsion" of the stomach.
- In the sagittal plane, the stomach moves downward, forward, and the body inclines from back to front. The gastric fundus, however, inclines from front to back, and as a result the stomach curls up in all planes.

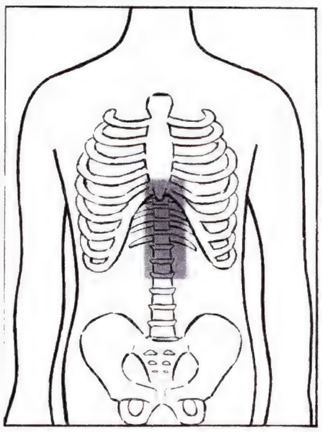


Fig. 6.1. Stomach: fascial diagnostic area

Fascial diagnostic area shown in figure 6.1

Position for diagnosis:

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: on the epigastric area

Normalization

Exhalation dysfunction: stomach area (figs. 6.2 and 6.3)

The practitioner: to the left of the patient

The right hand: palm flat, fingers, directed toward the right shoulder of the patient, slip under the left costal margin near the midline, trying to approach the area of the gastric fundus and the cardia.

The left hand: palm flat, placed a little above and to the left of the umbilicus, the fingers, directed toward the left shoulder of the patient, try to approach the area of the body of the stomach.

Fig. 6.2. Normalization for an exhalation dysfunction of the area of the stomach: position of the left hand

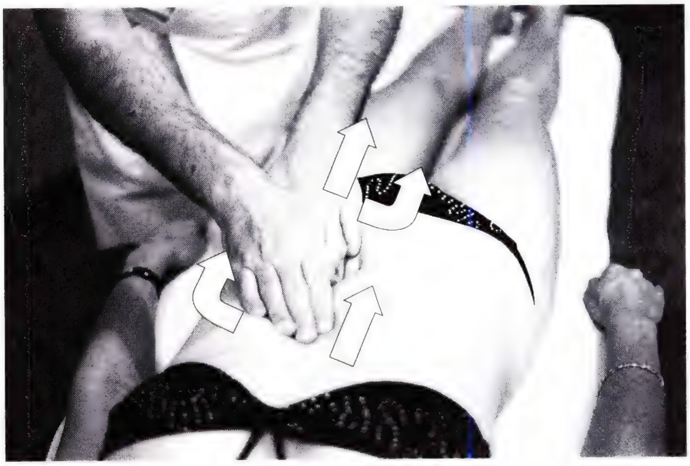


Fig. 6.3. Normalization for an exhalation dysfunction of the area of the stomach

The maneuver: exerting a tension toward the feet of the patient

The right hand: stretches the tissues and inclines its ulnar edge to the left in order to enhance the spreading out of the gastric fundus and to pull on the cardia.

The left hand: inclines to the right with its ulnar edge.

(Note: The efficacy of the above maneuver, particularly on the cardia, was demonstrated in a video session, which showed this stiffened area returning to a normal dynamic after a few maneuvers.)

Inhalation dysfunction: stomach area (fig. 6.4)

The practitioner: at the head of and toward the left of the patient

The right hand: palm flat, fingers, directed toward the feet of the

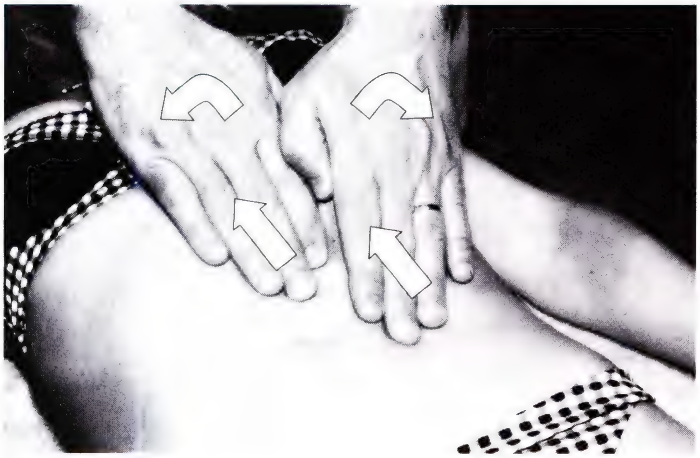


Fig. 6.4. Normalization for an inhalation dysfunction of the area of the stomach

patient, are placed below the left costal rim near the midline, trying to approach the area of the gastric fundus.

The left hand: palm flat, fingers, directed toward the feet of the patient, are placed a little above and to the left of the umbilicus, trying to approach the area of the body of the stomach.

The maneuver: with both hands exerting a tension toward the head of the patient

The right hand: with its heel induces an inclination toward the right.

The left hand: with its heel induces an inclination toward the left.

Normalization for the area of the pylorus (fig. 6.5)

For diagnosis: Using the pads of the fingers, the practitioner gently stretches the tissues in opposite directions, one hand moving toward the head of the patient, the other hand moving toward the feet. Then,

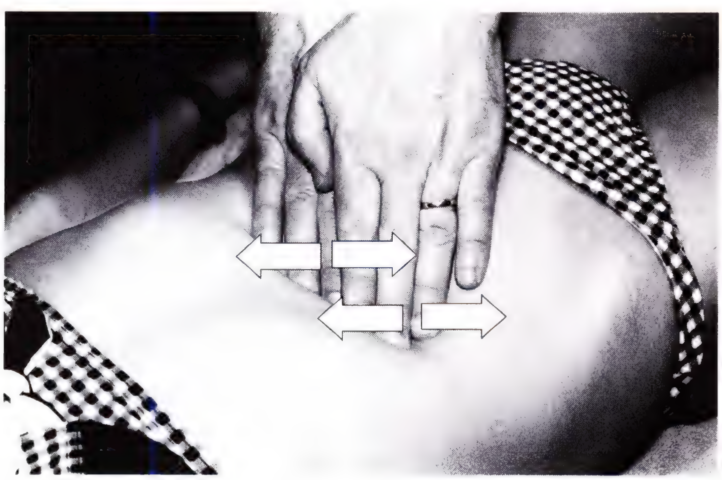


Fig. 6.5. Normalization for the area of the pylorus

without changing the positioning of the hands, the opposite movement is made—the hands switch the direction they are moving in. In a normal situation, the practitioner feels an elastic resistance wherein the tissues are acting to bring the hands back to the initial position. When this is not the case, the area is to be treated.

The maneuver: One treats by stretching toward the restriction found. According to the basic principle, the normalization is secured when one senses the return of the "elastic pull."

NORMALIZATION FOR THE AREA OF THE DUODENUM

Review of the dynamics:

- In the frontal plane, during inhalation, all parts of the duodenum descend. The first and second part of the duodenum tend to shift transversely to the left, whereas the fourth part of the duodenum and the duodenojejunal angle tend to shift to the right.
    - Thus, the duodenum closes its loop with the third part of the duodenum (which the root of the mesentery crosses), playing the role of a pivot point between the proximal and distal segments. Simultaneously, the duodenal mass inclines to the left.
- In the sagittal plane, all parts move downward, forward, and incline from back to front.

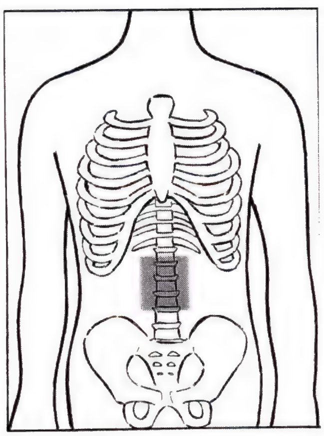


Fig. 6.6. Duodenum: fascial diagnostic area

Fascial diagnostic area shown in figure 6.6

Position for diagnosis:

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: on the umbilical area

Normalization for the Global Dynamics

Exhalation dysfunction: area of the duodenum (fig. 6.7)

The practitioner: to the left of the patient

The right hand: palm flat, placed in the left umbilical area, the fingers are directed toward the head of the patient.

Fig. 6.7. Normalization for an exhalation dysfunction of the area of the duodenum

The left hand: palm flat, placed under the right costal margin, the fingers are directed toward the head of the patient.

The maneuver: the two hands exert a tension toward the feet of the patient as they come closer toward each other and incline to the left of the patient.

Inhalation dysfunction: area of the duodenum (fig. 6.8)

The practitioner: at the head and to the left of the patient

The right hand: palm flat, fingers, directed toward the feet of the patient, are placed to the right of and above the umbilicus.

The left hand: palm flat, fingers, directed toward the feet of the patient, are placed to the left of and above the umbilicus.

The maneuver: the two hands exert a tension toward the head of the patient, while separating in opposite directions and rotating the heels of the hands toward the right.

Fig. 6.8. Normalization for an inhalation dysfunction of the area of the duodenum

Normalization by Segment

Palpatory diagnosis using fascial induction will at times distinguish dysfunctions that are localized to one or more segments of the duodenum. In this case, one can apply specific normalizations.

AREA OF THE BULB AND THE FIRST AND SECOND PARTS OF THE DUODENUM

Exhalation dysfunction: area of the bulb and the first and second parts of the duodenum (fig. 6.9)

The practitioner: to the left of the patient

The right hand: palm flat, fingers, directed toward the head of the patient, approach the area of the bulb.

The left hand: palm flat, fingers, directed transversely toward the right of the patient, approach the area of the first and second parts of the duodenum.

The maneuver: with both hands exerting a tension caudad and to the left of the patient, the right hand with its radial edge inclines toward the right, and the left hand with its radial edge inclines toward the left.

Fig. 6.9. Normalization for an exhalation dysfunction of the area of the bulb and the first and second parts of the duodenum

Inhalation dysfunction: area of the bulb and of the first and second parts of the duodenum (fig. 6.10)

The practitioner: to the right of the patient

The right hand: palm flat, fingers, directed toward the midline of the body, approach the area of the first and second part of the duodenum.

The left hand: palm flat, fingers, directed toward the feet of the patient, approach the area of the bulb.

The maneuver: with both hands exerting a tension cephalad and toward the right of the patient, the left hand with its heel induces an inclination toward the left, and the right hand with its heel induces an inclination toward the right.

Fig. 6.10. Normalization for an inhalation dysfunction of the area of the bulb and the first and second parts of the duodenum

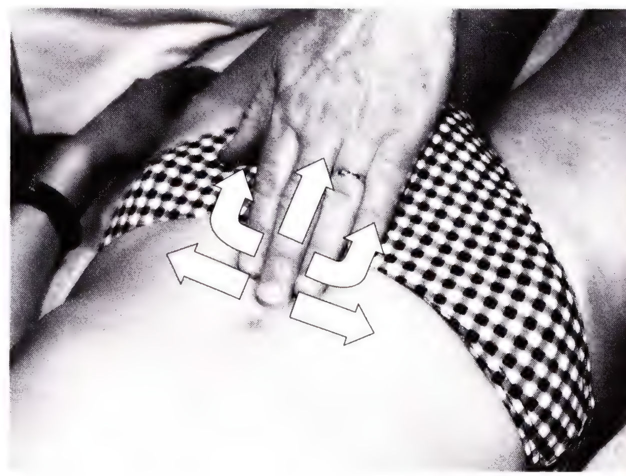


Fig. 6.11. Normalization for an exhalation dysfunction of the area of the third part of the duodenum

AREA OF THE THIRD PART OF THE DUODENUM

Exhalation dysfunction: area of the third part of the duodenum (fig. 6.11)

The practitioner: to the left of the patient

The left hand: palm flat, fingers are directed toward the head of the patient.

The maneuver: the left hand exerts a tension toward the feet of the patient while applying a corrective motion for the restriction found in the inclination (right or left) and the transverse shift (right or left).

Inhalation dysfunction: area of the third part of the duodenum (fig. 6.12)

The practitioner: at the head of and to the left of the patient

The right hand: palm flat, fingers are directed toward the feet of the patient.

The maneuver: the right hand exerts a tension toward the head of the patient while applying a corrective motion for the restriction found in the inclination (right or left) and the transverse displacement (right or left).

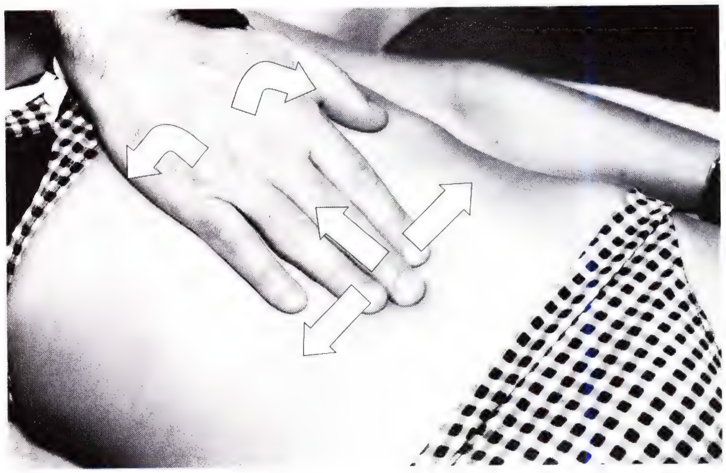


Fig. 6.12. Normalization for an inhalation dysfunction of the area of the third part of the duodenum

AREA OF THE FOURTH PART OF THE DUODENUM AND THE DUODENOJEJUNAL ANGLE

Exhalation dysfunction: area of the fourth part of the duodenum and the duodenojejunal angle (fig. 6.13)

The practitioner: to the left of the patient

The right hand: palm flat, fingers, directed toward the head of the patient, approach the area of the duodenojejunal angle.

The left hand: palm flat, fingers, directed toward the head of the patient, approach the area of the fourth part of the duodenum.

The maneuver: with both hands exerting a tension toward the right of and the feet of the patient, all the fingers produce an inclination toward the left.

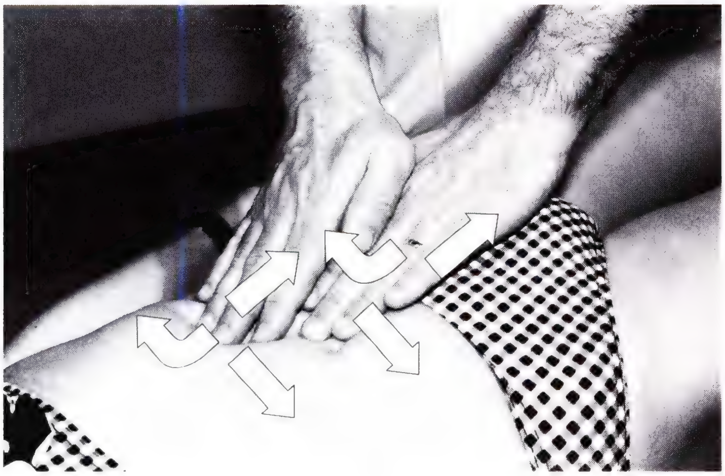


Fig. 6.13. Normalization for an exhalation dysfunction of the area of the fourth part of the duodenum and the duodenojejunal angle

Inhalation dysfunction: area of the fourth part of the duodenum and the duodenojejunal angle (fig. 6.14)

The practitioner: at the head of and to the left of the patient

The left hand: palm flat, fingers, directed toward the feet of the patient, approach the area of the fourth part of the duodenum.

The right hand: palm flat, fingers, directed toward the feet of the patient, approach the area of the duodenojejunal angle.

The maneuver: with both hands exerting a tension toward the head of and to the left of the patient, the heels of the hands produce an inclination toward the right.

Fig. 6.14. Normalization for an inhalation dysfunction in the area of the fourth part of the duodenum and the duodenojejunal angle

NORMALIZATION FOR THE AREA OF THE JEJUNUM AND ILEUM

Review of dynamics:

- In the frontal plane, during inhalation, the jejunum and ileum (mesenterial intestine) descend. They spread out laterally toward the ascending and descending colons, which in turn incline toward the midline and meet the jejunum and ileum.
  - These observed movements support the proposed role of the mesenterial intestine as being a distributor of pressure.
- In the sagittal plane, the jejunum and ileum move downward, forward, and incline from back to front.

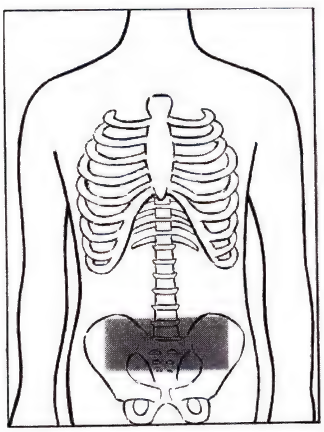


Fig. 6.15. Jejunum and ileum: fascial diagnostic area

Fascial diagnostic area shown in figure 6.15

Position for diagnosis:

The patient: lying on back

The practitioner:

- for the *jejunum*, standing to the left of the patient
  - the right hand: in the lumbar area
  - the left hand: below and to the left of the umbilicus
- for the *ileum*, standing to the right of the patient
  - the right hand: below and to the right of the umbilicus
  - the left hand: in the lumbar area

Normalization

Exhalation dysfunction: area of the jejunum and ileum

First technique: for the larger abdomen (fig. 6.16)

The practitioner: to the right of the patient

The right hand: with its ulnar edge placed on the midline, fingers directed toward the head of the patient, the hand tries to approach the ileum.

Fig. 6.16. Normalization for an exhalation dysfunction of the area of the jejunum and ileum: for the larger abdomen

The left hand: with the radial edge placed slightly to the left of the midline, the fingers directed toward the pubis, the hand tries to approach the jejunum.

The maneuver: the two hands exert a tension toward the feet of the patient; the palm of the left hand separates itself from the fingers of the right hand by making an open "V." By reversing the positions of the hands, the practitioner can also stand to the left of the patient.

Fig. 6.17. Normalization for an exhalation dysfunction of the area of the jejunum and ileum: for the smaller abdomen or for children

Second technique: for the smaller abdomen or for children (fig. 6.17)

The practitioner: places the palms flat on both sides below the umbilicus, the fingers directed toward the head of the patient.

The maneuver: the two hands exert a tension toward the feet of the patient and separate at the fingertips.

Inhalation dysfunction: area of the jejunum and ileum (fig. 6.18)

The practitioner: at the head of the patient

The right hand: palm flat, fingers are directed toward the feet of the patient, in the area of the ileum.

The left hand: fingers are directed toward the feet of the patient, in the area of the jejunum.

The maneuver: the two hands take a hold of the bulk of the jejunum and ileum and exert a tension toward the head of the patient, while the heels of both hands are being brought together.

Fig. 6.18. Normalization for an inhalation dysfunction of the area of the jejunum and ileum

Fig. 6.19. Normalization for the area of the root of the mesentery

Normalization for the area of the root of the mesentery (fig. 6.19)

Using the diagnostic principle of fascial induction, one treats this area according to the direction in which the restriction is found. Without changing sides, the practitioner can test the root in both directions. A description for one placement of the hands is given; the other direction is tested by inverting the position of the hands.

The practitioner: to the left of the patient

The right hand: fingers are directed toward the feet of the patient, in the area of the proximal portion of the root.

The left hand: fingers are directed toward the head of the patient, in the distal portion of the root.

The maneuver: the two hands exert a tension in opposite directions, toward the head and the feet of the patient.

NORMALIZATION FOR THE AREA OF THE ILEOCECAL VALVE

We cannot emphasize enough the necessity of normalizing this junctional area, which presents all the characteristics of a sphincter. Let us remember that distention of the small intestine brings about a lowering of the pressure in this sphincter and permits the rapid evacuation of the intestinal contents toward the cecum, which distends by "receptive relaxation." This distention of the cecum in turn stimulates colonic contractions, evacuating the chyme from the right side to the left side of the colon.

The ileocecal valve is essential in the prevention of cecal reflux toward the ileum. In the event of impaired functioning, the contents of the cecum move back into the ileum and thus increase the local bacterial population. Remember also that aberrant anatomical localizations of the cecum are very frequent. An appendectomy scar is often indicative of trouble in this area and is also extremely useful in locating the area of the valve.

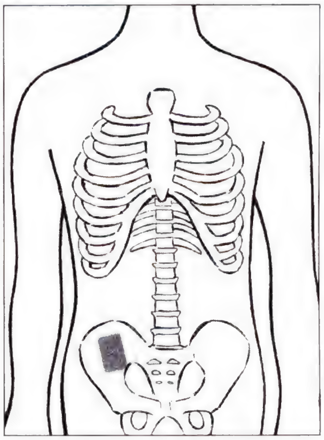


Fig. 6.20. Ileocecal valve: fascial diagnostic area

Review of dynamics:

- See under "Normalization for the Area of the Colon," p. 67.

Fascial diagnostic area shown in figure 6.20

Position for diagnosis:

The patient: lying on back

The practitioner: to the right of the patient

The hands: are positioned so that the finger pads have full contact with the area.

The right hand: in the area of the terminal part of the ileum, below and to the right of the umbilicus, as near as possible to the right iliac fossa

The left hand: in the area of the cecum, in the right iliac fossa

Diagnostic maneuver: the hands stretch the tissues in opposite directions, one toward the head, the other toward the feet of the patient; the maneuver for the fascial induction is gentle. Normally, the practitioner feels an elastic resistance in which the tissues are acting to bring the hands back to the initial position. When, however, the tissue feels non-extensible, one must consider the area to be fixed.

Normalization (fig. 6.21)

The practitioner: to the right of the patient

The maneuver: the hands are positioned as for the fascial induction test and carry out the same movement, but for treatment purposes, they maintain the "stretching" position. Gradually, the practitioner will feel a return to the normal elastic resistance.

Fig. 6.21. Normalization for the area of the ileocecal valve

NORMALIZATION FOR THE AREA OF THE COLON

Review of dynamics:

- *In summary*, during inhalation, the colon descends, advances, and tends to incline to the front. Moreover, in the frontal plane, it makes a global clockwise rotation movement while at the same time its ascending and descending segments are drawing closer together.

- In the frontal plane, during inhalation:

  - Descent: All the levels descend.

    - Closing its loop: The flexures and the transverse segment descend vertically more than the ascending and descending colons, the result being that the colon in its entirety tends to close its loop.

    - Global rotation: The colon also seems to make a global movement of rotation clockwise because there exists a greater descent of the left colic flexure and descending colon than of the right colic flexure and ascending colon. Most of the axes incline from the right to the left.

  - Inclination: The ascending colon, right colic flexure, transverse colon, left colic flexure, and iliac colon incline to the left, while the descending colon and cecum incline to the right.

  - Transverse movement: The right colic flexure, transverse colon, and descending colon shift transversely to the left.

- In the sagittal plane, most segments move downward, forward, and incline from back to front. There are a few exceptions to this direction of inclination: The cecum and left colic flexure incline from front to back, and the right colic flexure has no defined tendency.

- Other segmental features:

  - The ascending colon seems to organize itself and to pivot around a relatively fixed point situated at its union with the cecum.

  - The ascending colon and the descending colon tilt toward the interior during inhalation—coming to meet the flexures of the

jejunum and ileum, which spread out to the exterior—thereby securing a counterpressure and a distribution of the intra-abdominal pressure.

- The iliac colon seems to organize itself around a pivot point situated at its union with the first portion of the sigmoid. It tilts toward the exterior around a fixed point defined by the meeting point of two arms of the mesocolon.

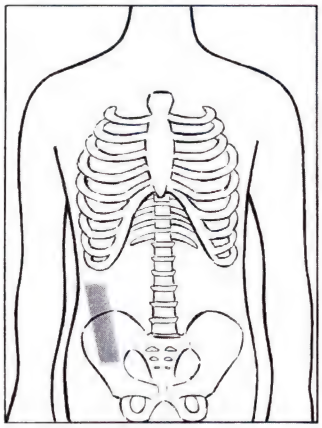


Fig. 6.22. Cecum and ascending colon: fascial diagnostic areas

Area of the Cecum and the Ascending Colon

Review of dynamics:

- See under "Normalization for the Area of the Colon," p. 67.

Fascial diagnostic area shown in figure 6.22

Position for diagnosis:

AREA OF THE CECUM

The patient: lying on back

The practitioner: to the right of the patient

The right hand: in the right iliac fossa

The left hand: in the lumbar area

AREA OF THE ASCENDING COLON

The patient: lying on back

The practitioner: to the right of the patient

The right hand: on the right flank

The left hand: in the lumbar area

Normalization

Exhalation dysfunction: area of the cecum and the ascending colon (fig. 6.23)

The practitioner: to the right of the patient

The right hand: lies in the cecal area, the fingers directed toward the midline.

The left hand: is placed on the right flank at the level of the upper part of the ascending colon as near as possible to the right costal margin, fingers directed toward the table.

The maneuver: the two hands exert a tension toward the feet of the patient. The right hand accentuates the pressure on its radial edge, trying to reproduce the rocking motion of the cecum laterally, while the left hand exerts, especially with its radial edge, a pressure toward the midline of the body.

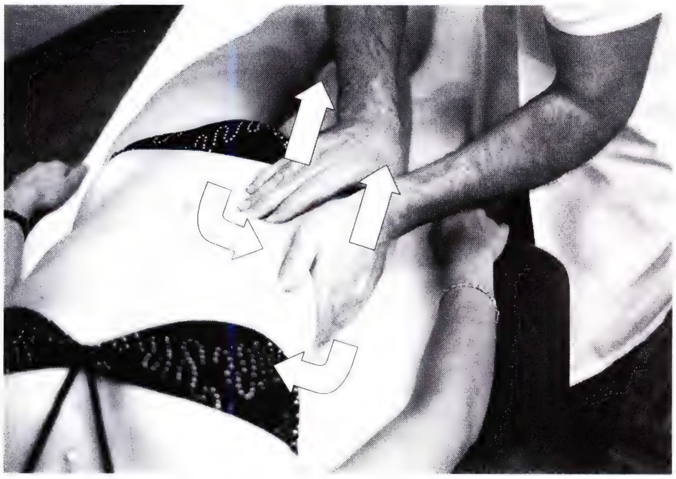


Fig. 6.23. Normalization for an exhalation dysfunction of the area of the cecum and ascending colon

Fig. 6.24. Normalization for an inhalation dysfunction of the area of the cecum and ascending colon

Inhalation dysfunction: area of the cecum and the ascending colon (fig. 6.24)

The practitioner: to the right of the patient

The right hand: is placed transversely in the area of the cecum, palm flat, fingers directed toward the exterior.

The left hand: is placed in the area of the ascending colon, palm flat, fingers directed toward the midline of the body.

The maneuver: while both hands exert a tension toward the head of the patient, the right hand, with its ulnar edge, reproduces the swinging of the cecum toward the left, and the left hand, with its ulnar edge, reproduces the swinging of the ascending colon toward the right.

Area of the Ascending Colon, Right Colic Flexure, and Right Transverse Colon

Review of dynamics:

- See under "Normalization for the Area of the Colon," p. 67.

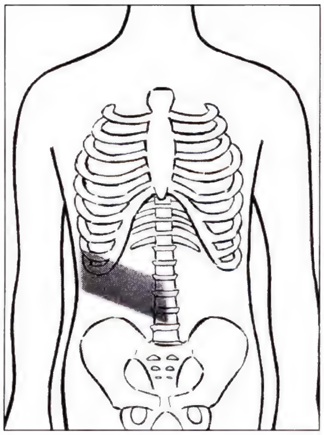


Fig. 6.25. Right colic flexure and right transverse colon: fascial diagnostic area

Fascial diagnostic areas shown in figures 6.22 (p. 68) and 6.25

Position for diagnosis:

AREA OF THE ASCENDING COLON

The patient: lying on back

The practitioner: to the right of the patient

The right hand: on the right flank

The left hand: in the lumbar area

AREA OF THE RIGHT COLIC FLEXURE AND RIGHT TRANSVERSE COLON

The patient: lying on back

The practitioner: to the right of the patient

The right hand: under the right costal margin

The left hand: in the lumbar area

Normalization

Exhalation dysfunction: area of the ascending colon, right colic flexure, and right transverse colon (fig. 6.26)

Note: The normalization of the colic flexures is carried out by addressing the segments situated downstream and upstream from them.

The practitioner: to the left of the patient

Fig. 6.26. Normalization for an exhalation dysfunction of the area of the ascending colon, right colic flexure, and right transverse colon

The right hand: palm flat, the hand is positioned with the fingertips under the right costal margin directed toward the right shoulder of the patient; the fingers approach the area of the right transverse colon.

The left hand: grasps the upper area of the ascending colon just under the costal margin, fingers toward the table.

The maneuver: both hands exert a tension toward the feet of the patient. The right hand applies a traction toward the left of the patient and inclines toward its ulnar edge while the left hand pulls its radial edge toward the midline. The joint effort of the two maneuvers draws the right colic flexure caudad and to the left.

(The inclination movement of the colic flexure, which we identified in our study, seems to be a "spreading out" due to the overlying pressure of the diaphragm. This inclination is generally regained when the physiologic dynamic is restored.)

Inhalation dysfunction: area of the ascending colon, right colic flexure, and right transverse colon (fig. 6.27)

The practitioner: to the right of the patient

The right hand: palm flat, is placed transversely in the area of the ascending colon, fingers directed toward the midline.

The left hand: palm flat, is placed in the area of the transverse colon, fingers directed toward the feet of the patient.

The maneuver: both hands exert a tension cephalad while the right hand, with its radial edge, inclines toward the right, and the left hand, with its heel, inclines equally toward the right.

Fig. 6.27. Normalization for an inhalation dysfunction of the area of the ascending colon, right colic flexure, and right transverse colon

Area of the Left Transverse Colon, Left Colic Flexure, and Descending Colon

Review of dynamics:

- See under "Normalization for the Area of the Colon," p. 67.

Fascial diagnostic areas shown in figure 6.28

Position for diagnosis:

AREA OF THE LEFT TRANSVERSE COLON AND LEFT COLIC FLEXURE

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: under the lowest of the left-side ribs

AREA OF THE DESCENDING COLON

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: in the left flank

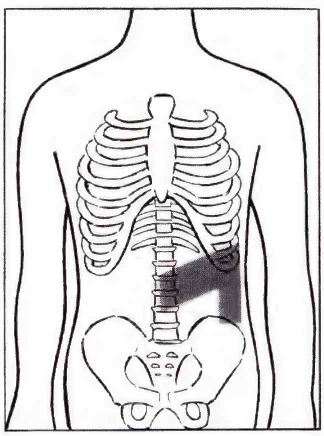


Fig. 6.28. Left transverse colon, left colic flexure, and descending colon: fascial diagnostic areas

Normalization

Exhalation dysfunction: area of the left transverse colon, left colic flexure, and the descending colon (fig. 6.29)

The practitioner: to the right of the patient

The right hand: grasps with the palm the area of the left flank, as close as possible to the costal margin in order to approach the area of the descending colon, fingers directed toward the table.

The left hand: is placed palm flat, under the left costal margin in the area of the left transverse colon, fingers directed toward the left shoulder of the patient.

The maneuver: while exerting a tension toward the feet of the patient, the right hand, with its radial edge, exerts a pressure toward the midline as the left hand exerts a traction toward the left and inclines on its radial edge. The combined effort of these two maneuvers has the effect of drawing the left colic flexure toward the patient's feet.

(In this normalization, the very small transverse shift (avg. 1.2 mm) of the descending colon to the left has not been taken into account, but rather we focus on its "rocking motion" toward the midline. Likewise, as was found with the right colon, the normal "spreading out" movement of the organ is regained when the overall physiologic dynamic has been restored. The movement of the transverse colon to the left could also be regained by freeing the left colic flexure and ascending colon.)

Fig. 6.29. Normalization for an exhalation dysfunction of the areas of the left transverse colon, left colic flexure, and descending colon

Fig. 6.30. Normalization for an inhalation dysfunction of the area of the left transverse colon, left colic flexure, and descending colon

Inhalation dysfunction: area of the left transverse colon, left colic flexure, and the descending colon (fig. 6.30)

The practitioner: to the left of the patient

The right hand: palm flat, fingers, directed toward the feet of the patient, approach the area of the left transverse colon.

The left hand: palm flat, fingers, directed toward the midline, approach the area of the descending colon.

The maneuver: both hands exert a tension toward the head of the patient while the right hand accentuates the pressure with its radial edge and inclines toward the right with its heel. At the same time, the left hand inclines toward the left with its radial edge.

Area of the Descending Colon and Iliac Colon

Review of dynamics:

- See under "Normalization for the Area of the Colon," p. 67.

Fascial diagnostic areas shown in figure 6.31

Position for diagnosis:

AREA OF THE DESCENDING COLON

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: in the left flank

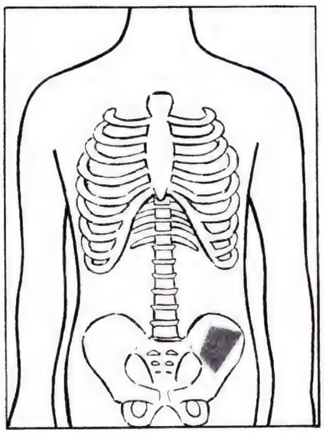


Fig. 6.31. Iliac colon: fascial diagnostic area

AREA OF THE ILIAC COLON

The patient: lying on back

The practitioner: to the left of the patient

The right hand: in the lumbar area

The left hand: in the left iliac fossa

Normalization

Exhalation dysfunction: area of the descending and iliac colon (fig. 6.32)

The practitioner: to the left of the patient

The right hand: grasps the left flank in order to approach the area of the descending colon, the fingers directed toward the table.

The left hand: grasps the area of the iliac colon, fingers directed toward the midline.

The maneuver: while exerting a tension toward the feet of the patient, the right hand, with its radial edge, exerts a pressure toward the midline, while the left hand, with its radial edge, emphasizes the rocking motion laterally of the iliac colon around a pivot point.

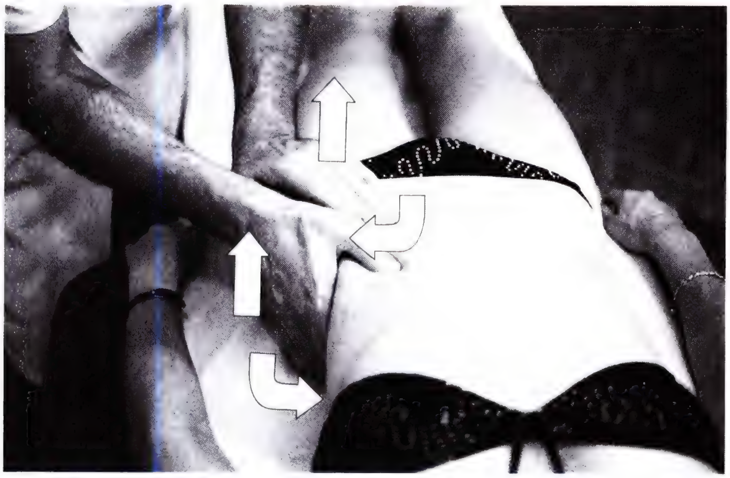


Fig. 6.32. Normalization for an exhalation dysfunction of the areas of the descending colon and iliac colon

Inhalation dysfunction: area of the descending and iliac colon (fig. 6.33)

The practitioner: to the left of the patient

The right hand: palm flat, fingers, directed toward the midline, are placed in the area of the descending colon.

The left hand: palm flat, fingers, directed toward the left, are placed in the area of the iliac colon.

The maneuver: both hands exert a tension toward the head of the patient while the right hand inclines with its ulnar edge toward the left, and the left hand inclines with its ulnar edge toward the right.

Fig. 6.33. Normalization for an inhalation dysfunction in the area of the descending colon and iliac colon

NORMALIZATION FOR THE AREA OF THE LIVER

Review of dynamics:

- In the frontal plane, during inhalation, the liver shows a vertical shift downward.
- In the sagittal plane there is the same downward movement as seen in the frontal plane.

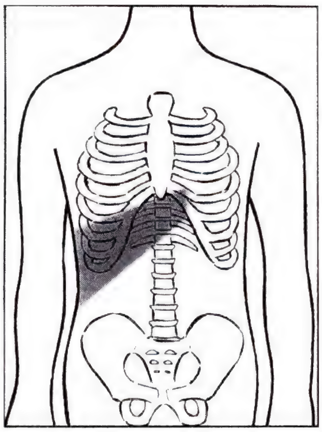


Fig. 6.34. Liver: fascial diagnostic area

Fascial diagnostic area shown in figure 6.34

Position for diagnosis:

The patient: lying on back

The practitioner: to the right of the patient

The left hand: spread out under the right posterolateral flank of the patient

The right hand: comes under the rib cage, with the palm flat, fingers directed toward the left axilla of the patient, and sends a fascial induction toward the opposite hand. Induce the motion in both the inhalation and exhalation directions to determine the pattern of the dysfunction.

Normalization

Exhalation dysfunction: area of the liver

The practitioner: to the right of the patient

The normalization can be carried out in two ways: regionally by lobe and globally.

REGIONALLY BY LOBE (FIG. 6.35)

Area of the left lobe

The practitioner: places both hands under the costal angle (beneath the xiphoid), the fingers of one hand covering the other with the fingers directed toward the head of the patient.

The maneuver: the practitioner creates a cephalocaudal tension on the superficial fascia. This tension is maintained and slightly increased as the tissues allow. One can utilize respiratory assistance.

Area of the "middle" lobe

(Note: "Middle lobe" is an unofficial term used to describe the "middle" paravesical part of the liver, the gallbladder being the landmark for this area.)

The positioning of the hands and the maneuver are the same as for the left lobe, except the initial position is shifted toward the area of the gallbladder.

Area of the right lobe

The positioning of the hands and the maneuver are the same as for the left lobe, except the initial position is shifted toward the area of the right lobe.

Fig. 6.35. Normalization for an exhalation dysfunction of the area of the left lobe of the liver, regionally by lobe

Fig. 6.36. Normalization for an exhalation dysfunction of the liver area, globally

GLOBALLY (FIG. 6.36)

The practitioner: to the right of the patient

The left hand: is spread out under the right posterolateral flank of the patient.

The right hand: palm flat, comes under the anterior rib cage, fingers directed toward the left axilla of the patient.

The maneuver: during diaphragmatic inhalation, both hands carry out a cephalocaudal maneuver of tension on the superficial fascia. This tension is maintained and slightly increased as the tissues allow. At the end of the normalization, when the fascia under the hand shows a tendency to retract in the cephalic direction, the practitioner may accompany this sensation with a movement in the cephalic direction during exhalation.

Inhalation dysfunction: area of the liver

The practitioner: to the right of the patient

The normalization can be carried out in two ways: regionally by lobe and globally.

REGIONALLY BY LOBE

Area of the left lobe (fig. 6.37)

The practitioner: places the right hand, palm flat, with the palm just below the costal angle in the sternal line over the left lobe of the liver. The fingers extend up onto the thorax. The left hand is spread out under the right lower thorax, with the fingertips coming into contact with the vertebral spines.

The maneuver: using a compression, the practitioner carries the unit of the fascia and organ in the cephalic direction. The two hands maintain a constant tension until there is the perception of a relaxation in the tissues followed by a force returning the tissues toward the inhalation position. One can utilize respiratory assistance, asking the patient to exaggerate the respiration a little more than normal.

Variation: Both hands are positioned anteriorly over the left lobe, one on top of the other under the anterior costal angle.

Area of the "middle" and right lobes

The positioning of the hands and the maneuver are the same as that described for an inhalation dysfunction of the left lobe of the liver, except that the hands are shifted toward the area of the "middle" or right lobe.

Variation: The same normalization can be carried out in the left lateral decubitus position (fig. 6.38).

GLOBALLY

The practitioner: the positioning of the hands is the same as for the global treatment of the exhalation dysfunction of the area of the liver (fig. 6.36).

The maneuver: the practitioner exerts a tension to carry the fascial-organ unit in a caudocephalic direction. The abdominal hand will come up over the costal margin. One can utilize respiratory assistance.

Fig. 6.37. Normalization for an inhalation dysfunction of the area of the left lobe of the liver

Fig. 6.38. Normalization for an inhalation dysfunction of the area of the "middle" or right lobe of the liver in the left lateral decubitus position

NORMALIZATION FOR THE AREA OF THE KIDNEY

Review of dynamics:

- In the frontal plane, during inhalation, both kidneys show a vertical shift downward, and the apex of the left kidney inclines to the right.
- In the sagittal plane, there is the same downward vertical movement as seen in the frontal plane. Simultaneously, the kidneys shift forward and show a tendency toward a posterior inclination of their apexes at the end of the respiratory movement.

Area of the Right Kidney

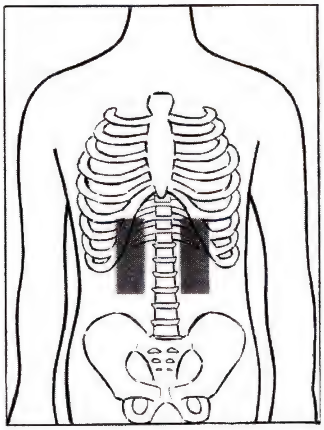


Fig. 6.39. Kidneys; fascial diagnostic areas

Fascial diagnostic area shown in figure 6.39

Position for diagnosis:

The patient: lying on back

The practitioner: to the right of the patient

The left hand: is spread out on the paralumbar renal area in the space bounded by the external oblique in front, the paraspinal muscles behind, and the serratus posterior inferior and twelfth rib above.

The right hand: is placed on the abdomen in the paramedian renal area, facing the opposite hand. The right hand sends the fascial induction toward the left hand, inducing the motion in both the

inhalation and exhalation directions to determine the pattern of the dysfunction.

Normalization

Exhalation dysfunction: area of the right kidney (fig. 6.40)

The practitioner: takes the position described for diagnosis.

The maneuver: the practitioner will find it helpful to lower the table and place his/her cephalic (left) elbow on his/her knee. Both hands will then create a tension in the cephalocaudal direction. One can utilize respiratory assistance. This tension is maintained and slightly increased as the tissues allow. At the end of the normalization, the practitioner can accompany the exhalation movement in the cephalic direction.

Inhalation dysfunction: area of the right kidney (fig. 6.41)

The practitioner: to the right of the patient

The right hand: flat on the abdomen, the fingers are directed toward the head in the midclavicular line.

The left hand: is spread out in the paralumbar area from T12–L3, as described in the position for diagnosis.

The maneuver: using a compression, the practitioner carries the unit of the fascia and organ in the cephalic direction. The two hands maintain a constant tension until there is the perception of a relaxation in the tissues followed by a force returning the tissues toward

Fig. 6.40. Normalization for an exhalation dysfunction of the area of the right kidney

Fig. 6.41. Normalization for an inhalation dysfunction of the area of the right kidney

inhalation, which the practitioner can accompany. It is also possible to ask the patient to assist with respirations.

Variation: The same normalizations can be carried out in the left lateral decubitus position or with the patient lying on the abdomen.

Area of the Left Kidney

Facial diagnostic area shown in figure 6.39

Position for diagnosis:

The patient: lying on back

The practitioner: to the right of the patient

The right hand: reaching over the patient, the hand is spread out in the paralumbar area from T12–L3, in the space bounded by the external oblique in front, the paraspinal muscles behind, and the serratus posterior inferior and the twelfth rib above.

The left hand: flat on the abdomen, the fingers pointed toward the head in the midclavicular line. The left hand sends the fascial induction toward the opposite hand that it faces, inducing the motion in both the inhalation and exhalation directions to determine the pattern of the dysfunction.

Normalization

Exhalation dysfunction: area of the left kidney (fig. 6.42)

The practitioner: takes the position for diagnosis as described above.

The maneuver: using compression, the practitioner carries the unit of the fascia and organ in the caudal direction accompanied by a mild adduction. One can utilize respiratory assistance.

Note: The normalization movement for the spleen (fig. 6.45) can also be applied for an exhalation dysfunction of the area of left kidney.

Fig. 6.42. Normalization for an exhalation dysfunction of the area of the left kidney

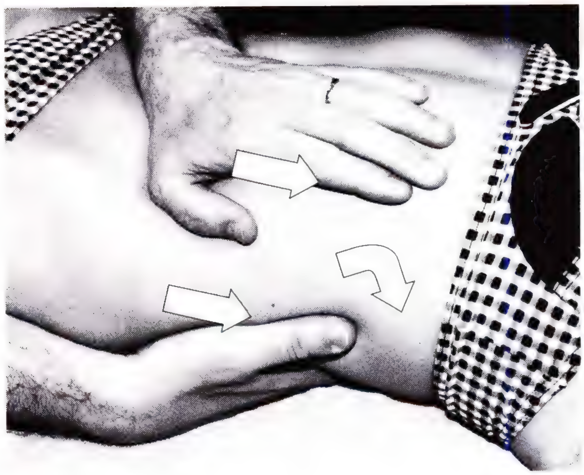


Fig. 6.43. Normalization for an inhalation dysfunction of the area of the left kidney

Inhalation dysfunction: area of the left kidney (fig. 6.43)

The practitioner: takes the position for diagnosis as described above.

The maneuver: using compression, the practitioner carries the unit of the fascia and organ in the cephalic direction accompanied by a mild abduction. One can utilize respiratory assistence.

NORMALIZATION FOR THE AREA OF THE SPLEEN

Review of the dynamics:

- In the frontal plane, during inhalation, the spleen shows a vertical shift downward and an inclination of its apex to the right.
- In the sagittal plane, there is the same downward vertical movement as seen in the frontal plane. Simultaneously, the spleen tends to move forward.

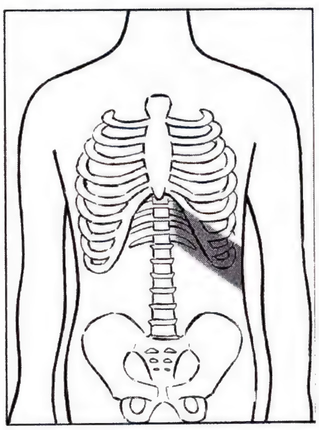


Fig. 6.44. Spleen: fascial diagnostic area

Fascial diagnostic area shown in figure 6.44

Position for diagnosis:

The patient: lying on back

The practitioner: to the right of the patient

The left hand: cradles the patient in the left arm, placing the hand under the posterolateral left rib cage, at the level of the spleen

The right hand: is placed on the abdomen, under the rib cage, fingers directed toward the right axilla of the patient, sending the

fascial induction toward the opposite hand, inducing the motion in both the inhalation and exhalation direction to determine the pattern of the dysfunction.

Normalization

Exhalation dysfunction: area of the spleen (fig. 6.45)

The practitioner: takes the position described for diagnosis.

The maneuver: both hands, facing each other, simultaneously create a cephalocaudal tension during diaphragmatic inhalation. One can utilize respiratory assistance. The practitioner maintains this tension and slightly increases it as the tissues allow. In addition, the anterior hand adds a tension toward the midline while the posterolateral hand provides an adduction movement to the lower rib cage toward the midline. At the end of the normalization, the practitioner can accompany the exhalation with a movement back toward the initial position.

It is also possible to utilize the position for the inhalation dysfunction described in the following section. The practitioner carries the unit of the fascia and organ in the caudal direction accompanied by a global movement of adduction.

Fig. 6.45. Normalization for an exhalation dysfunction of the area of the spleen and left kidney

Inhalation dysfunction: area of the spleen (fig. 6.46)

The practitioner: to the right of the patient

The right hand: reaching over the patient, the hand is spread out in the area of the lower ribs posteriorly.

The left hand: on the abdomen, the palm is under the costal margin; the fingers extend superolaterally onto the left rib cage.

The maneuver: using compression, the practitioner carries the unit of the fascia and organ in the cephalic direction accompanied by a mild abduction. The two hands maintain a constant tension until there is the perception of a relaxation in the tissues followed by a force returning the tissues toward inspiration, which the practitioner can accompany.

Fig. 6.46. Normalization for an inhalation dysfunction of the area of the spleen

NORMALIZATION FOR THE AREA OF THE PANCREAS

Review of dynamics:

- In the frontal plane, during inhalation, the pancreas shows a vertical shift downward.
- In the sagittal plane, there is the same downward vertical movement as seen in the frontal plane. Simultaneously, the apex of the pancreas tends to incline posteriorly and shift backward *(Note: The examination of the pancreas encountered the technical limits of the echographic imagery and may not be fully accurate).*

Fascial diagnostic area shown in figure 6.47

Position for diagnosis:

AREA OF THE HEAD OF THE PANCREAS

The patient: lying on back

The practitioner: to the right of the patient

The left hand: placed in the right paralumbar diagnostic area

The right hand: flat, to the right of the umbilicus, fingers directed toward the head of the patient, sends out the fascial induction toward the opposite hand, inducing the motion in both the inhalation and exhalation direction to determine the pattern of the dysfunction.

AREA OF THE TAIL OF THE PANCREAS

The patient: lying on back

The practitioner: to the right of the patient

The hands: the position of the hands is inverted from that used for the head of the pancreas—the right hand under the rib cage in the left paralumbar area, the left hand on the abdomen over the area of the tail, fingers directed toward the left of the patient, according to the longitudinal axis of the pancreas. The practitioner then carries out the fascial inductions.

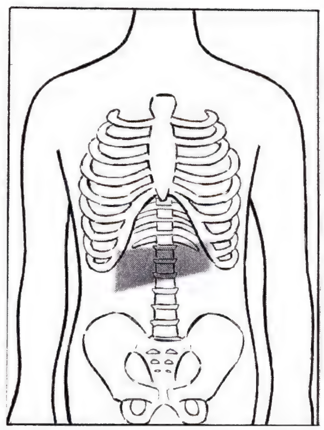


Fig. 6.47. Pancreas: fascial diagnostic area

Normalization

Exhalation dysfunction: area of the pancreas (fig. 6.48)

The practitioner: will use both the hand positions described on the previous page, one position after the other.

Fig. 6.48. Normalization for an exhalation dysfunction of the area of the pancreas

The maneuver: each time, both hands, facing each other, simultaneously create a cephalocaudal tension, which is increased with each diaphragmatic respiration. At the end of the normalization, the practitioner accompanies the sensation of fascial retraction back toward the initial position.

Inhalation dysfunction: area of the pancreas

Same technique as for the exhalation dysfunction, but the direction for the normalization is reversed to caudocephalic.

part three

A Clinical Application

chapter 7

Osteopathic Approach to Hiatal Hernia and Gastroesophageal Reflux

In this chapter, we present the application of osteopathic principles and our research to the common clinical problems of hiatal hernia and gastroesophageal reflux disease. We begin with a review of the pertinent anatomy and physiology to serve as a foundation for the discussions that follow of the research findings, clinical presentations, patient evaluation, and osteopathic treatment.

REVIEW OF ANATOMY AND PHYSIOLOGY

The Lower Esophageal Sphincter

The sphincteral complex of the lower esophagus includes (fig. 7.1):

- the epiphrenic ampulla
- the area of the sphincter
  - diaphragmatic: the hiatal anulus (B)
  - lower esophageal: the vestibule and the cardiac orifice

The epiphrenic ampulla (1) is a simple transitory dilation of the lower esophagus observed at the end of inhalation.

The area of the sphincter has two components:

Diaphragmatic (2): The diaphragm contributes to the sphincter through the function of the hiatal annulus.

Lower esophageal (3):

The *vestibule* (F) (the esophageal segment between the diaphragm and cardia): The vestibule is the anatomic location of the functional lower esophageal sphincter. This sphincter is an area of hypertonicity as revealed by manometric studies, and it is characterized by a thickening of the muscular layer. It is situated between the abdominal and

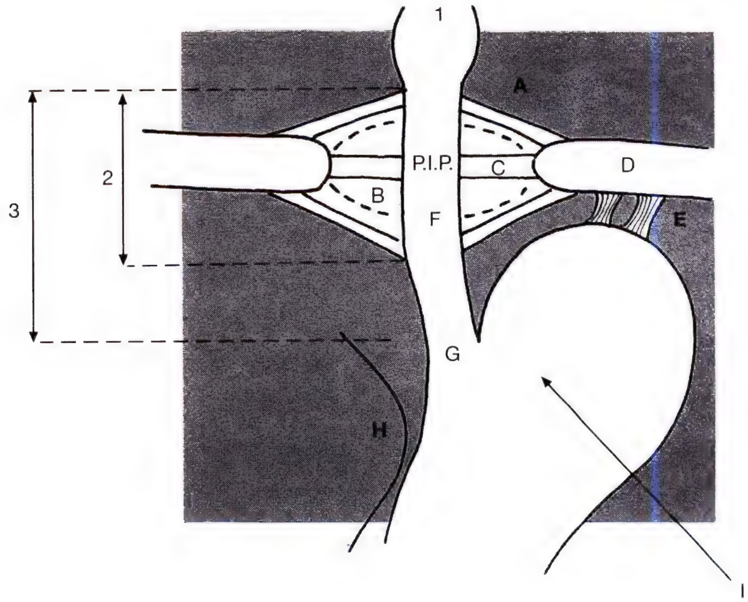


Fig. 7.1. The sphincteral complex of the lower esophagus

1. Epiphrenic ampulla
2. Diaphragmatic sphincter
   - A. Phrenoesophageal membrane
   - B. Opening of the hiatal anulus
   - C. Circular muscular fibers (of Rouget)
   - D. Diaphragm
   - E. Gastrophrenic ligament
3. Esophageal sphincter
   - F. Vestibule: area of hypertonus (L.E.S.)
   - G. Cardiac orifice
   - H. Coronary falx of the stomach (the peritoneal fold formed by the coronary artery of the stomach or gastric artery)
   - I. Abdominal pressure

P.I.P. Pressure Inversion Point

thoracic cavities and passes into the abdomen during inhalation and into the thorax during exhalation.

The *cardiac orifice* (G): The cardiac orifice is the opening of the esophagus into the stomach at the muscular gastroesophageal union. It generally is situated two centimeters to the left of the midline, and its position corresponds to the left crus of the diaphragm, to the body of the eleventh thoracic vertebra, and to the area posterior and to the right of the aorta. Anteriorly, it is connected with the left lobe of the liver, in which it makes a groove and corresponds to the level of the left seventh costal cartilage. The oblique implantation of the esophagus into the stomach forms the cardiac notch of the stomach (incisura cardiaca ventriculi) of which the esophageal-cardiac plica is the internal manifestation.

The elements maintaining the sphincteral area in place are:

- *Phrenicoesophageal ligament* (A): Arising from the subdiaphragmatic fascia, its superior extension inserts at the epiphrenic ampulla-vestibular junction, and its inferior extension travels to the cardiac notch of the stomach.
- *Circular muscular fibers* (C): These fibers are stretched out between the diaphragm and the esophagus. *(Note: Rouvière, in* Anatomie

Humaine, *describes these as the "muscles of Rouget," which are individualized fibers in the region of the phrenicoesophageal membrane.)*

- *Gastrophrenic ligament* (E): This is fibrous tissue that connects the diaphragm to the gastric fundus.
- *Coronary falx of the stomach* (H): This is a peritoneal fold formed by the coronary artery of the stomach (gastric artery). Concave below, it is stretched out between the celiac trunk and the posterior flank of the lesser curvature, a little above the cardiac notch of the stomach.

The Diaphragm

Contributing to the formation of the center of the diaphragm, there is a transversely elongated tendinous lamina that occupies the central part and describes the orifice of the inferior vena cava. Peripherally, the diaphragm's muscular portion inserts onto the lower six ribs, the sternum, and the spine. The vertebral portion includes an internal part and an external part. The external part is a muscular lamina attached to the arch of the psoas muscle; the lamina extends from the body of L2, goes around in front of the psoas, and ends at the base of the transverse process of L1. The internal part constitutes the crura of the diaphragm.

The crura of the diaphragm include the right and left crus. The right crus, wider and longer than the left, inserts onto the anterior face of the bodies of L2, L3, and often L4, as well as on the adjoining intervertebral discs. The left crus inserts onto the body of L2 and on the adjoining intervertebral discs; it often extends onto L3. The tendon of each crus becomes a fleshy body that extends to and ends on the posterior opening of the diaphragmatic center.

The costal portion of the diaphragm inserts onto the internal aspect of the lower six costal arches and on three aponeurotic arches, which in turn insert themselves from the tenth to the eleventh rib, from the eleventh to the twelfth, and from the twelfth rib to the transverse process of L1, by crossing the quadratus lumborum muscle. This latter arch is called the lateral lumbocostal arch. The sternal portion of the diaphragm inserts onto the posterior aspect of the xiphoid process.

THE MAIN DIAPHRAGMATIC ORIFICES (FIG. 7.2):

The aortic orifice (fig. 7.3): At the level of T12, the crura join each other by way of the median arcuate ligament to form the aortic orifice. The elements making the orifice are fibrous and not muscular in nature, in order to ensure the constant opening necessary for aortic flow. However, its quadrilateral shape does allow for a relative closure during inhalation, preventing the reflux of blood that could result from the increase in abdominal pressure. The aortic orifice is also the passageway for the thoracic duct.

The esophageal orifice (the hiatal anulus): There are two muscular fascicles, which go from the median arcuate ligament, cross each other at the level of T10, and circumscribe the esophageal orifice. This orifice gives passage to the esophagus and to the two pneumogastric branches of the vagus nerve. The esophageal hiatus is a muscular orifice and plays the role of an external gastroesophageal sphincter by means of its contraction during inhalation. This action is controlled by the right crus, which presses down onto the esophagus at the end of inhalation.

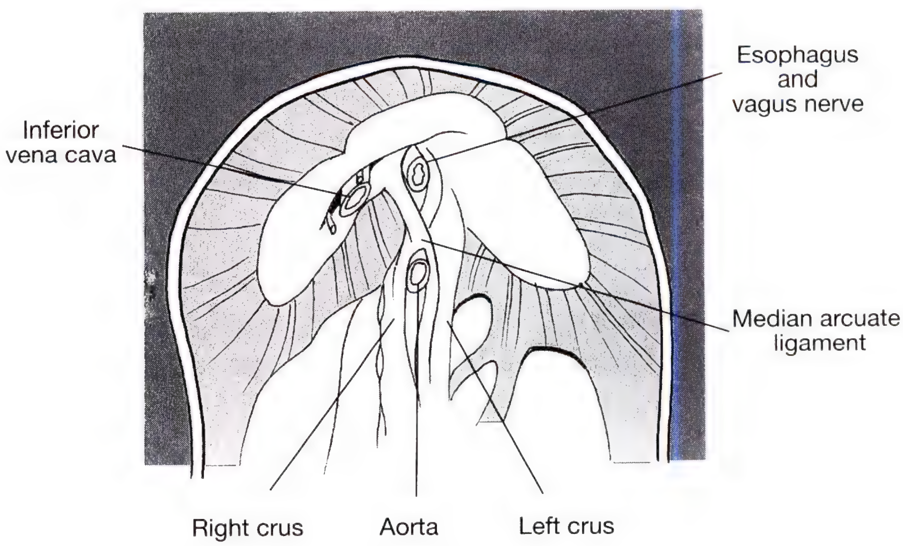


Fig. 7.2. Inferior view of the diaphragm (according to Rouvière)

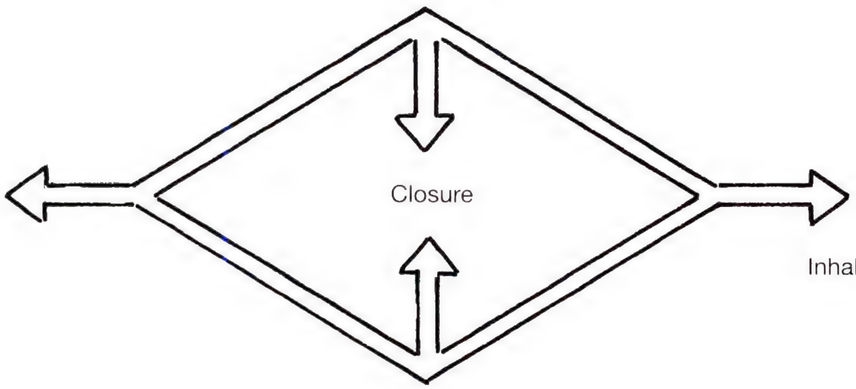


Fig. 7.3. Function of the aortic orifice of the diaphragm

The orifice for the inferior vena cava: Situated in the central tendon of the diaphragm, this orifice is bordered posteromedially and anterolaterally by the fibrous leaves of the central tendon (superior and inferior semicircular lamina). The inferior vena cava adheres to the tendon throughout its periphery.

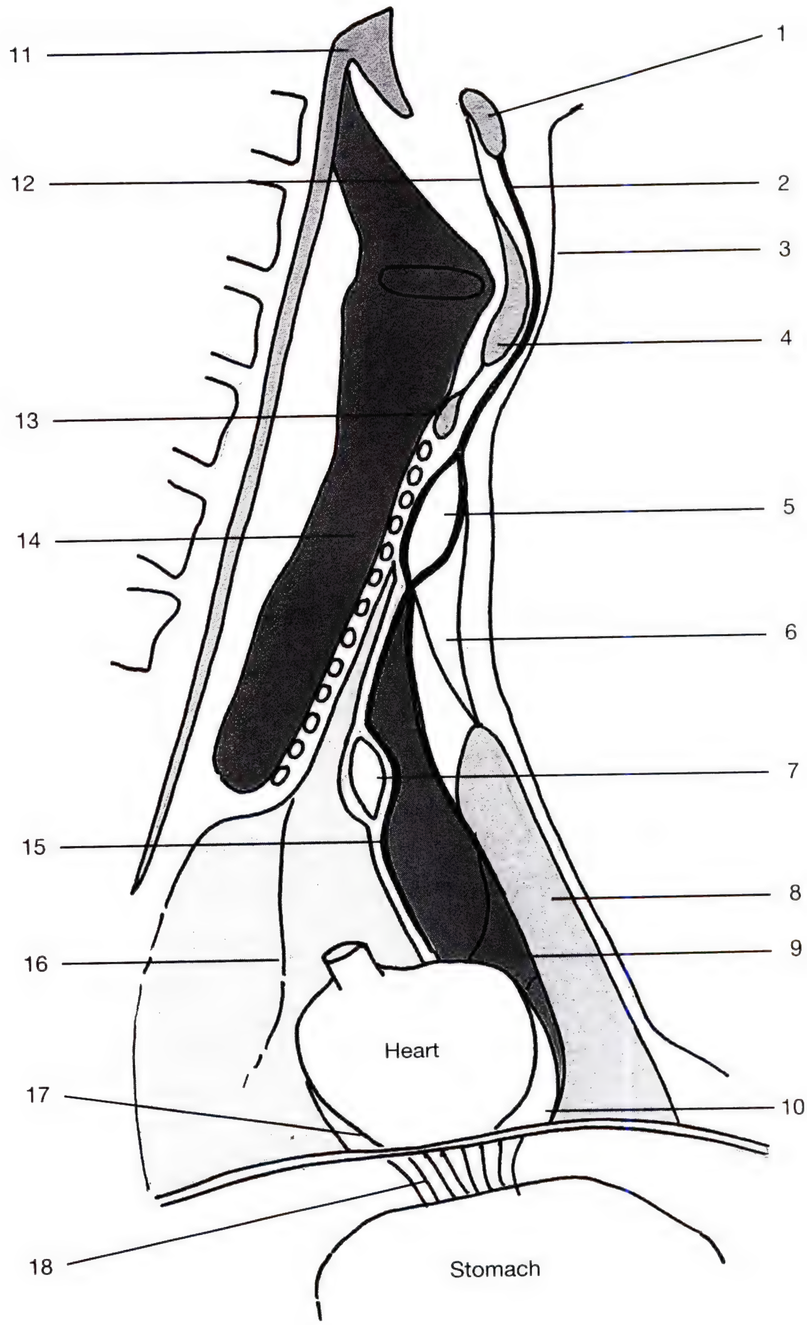
The orifice for the sympathetic nervous system, splanchnic nerves, and azygos veins: The sympathetics go through an orifice situated between the crura of the diaphragm and an expansion of the psoas arch. The greater splanchnics cross the space between the principal and accessory fascicle of each crus, left and right. The lesser splanchnics usually travel with the sympathetic trunk, but they also can go through the diaphragm via the orifices for the greater splanchnics or via their own orifices, situated between the greater splanchnics and the sympathetics. The internal root of the right azygos vein and the internal root of the left hemiazygos vein most often go through the orifices for the greater splanchnics.

The Cervicogastric Chain of Fascia

The thyro- or cervicopericardial fascia (lamina) (fig. 7.4) is continuous with the pretracheal layer of fascia (lamina), which originates from two thin sheets (superficial and deep) on the hyoid bone. The superficial layer of the pretracheal fascia goes from one omohyoid muscle to the other, sheathing the omohyoid and sternohyoid muscles. Inferiorly, it inserts itself on the sternal notch and the clavicle, where it forms the suprasternal space (fossa of Gruber), which creates a blind diverticulum

Fig. 7.4. Gastric-phrenic-mediastinal-vertebral-cranial chain (according to Rouvière)

1. Hyoid bone
2. Pretracheal lamina
3. Superficial lamina
4. Thyroid cartilage
5. Thyroid
6. Sternothyroid muscle
7. Left brachiocephalic trunk
8. Sternum
9. Superior sternopericardial ligament
10. Inferior sternopericardial ligament
11. Esophagus
12. Thyrohyoid membrane
13. Cricoid cartilage
14. Trachea
15. Thyro- or cervicopericardial lamina
16. Visceral sheath
17. Phrenopericardial ligament
18. Gastrophrenic ligament



on both sides. This diverticulum extends back to the sternocleidomastoid muscle, giving way to the horizontal portion of the jugular vein. Laterally, the superficial lamina merges with the cellular-fibrous tissue that surrounds the deep lymphatic nodes of the neck and extends up to the trapezius.

The deep layer of fascia surrounds the sternothyroid and thyrohyoid muscles. It unites with the visceral sheath in order to form the thyro- or cervicocardiac lamina. The visceral sheath is a thin membrane fastened to the transverse processes on both sides of the prevertebral fascia by expansions called the "sagittal septums." The visceral sheath surrounds the esophagus and the trachea, and it covers the constrictor muscles of the pharynx; at this level, it is called the peripharyngeal lamina. It extends inferiorly toward the mediastinum.

At the level of the body of the thyroid, the visceral sheath splits in two: The deep thin sheet, after having sheathed the thyroid, goes down onto the trachea and the larynx; the superficial thin sheet also covers the body of the thyroid and then unites at the deep plane of the pretracheal fascia, which completes anteriorly the sheath of the thyroid body. From then on, the union of these thin sheets forms the thyro- or cervicopericardial lamina, which surrounds the inferior thyroid vein and the left brachiocephalic trunk and then extends down to the pericardium.

The underlying phrenicopericardial and gastrophrenic ligaments complete this cervicogastric chain of fascia.

The Vagus (Pneumogastric) Nerves

In order to understand the osteopathic treatment for gastroesophageal conditions, it is useful to recall some of the anatomical details of the vagus nerve (fig. 7.5).

Originating in the medullary bulb, the vagus nerve travels out into the lateral sulcus and passes through the jugular foramen. This foramen is situated in the middle part of the temporal-occipital suture and is bounded anteriorly and laterally by the posterior edge of the petrous portion of the temporal bone and medially by the lateral edge of the lateral mass of the occiput. The front of the jugular foramen is formed

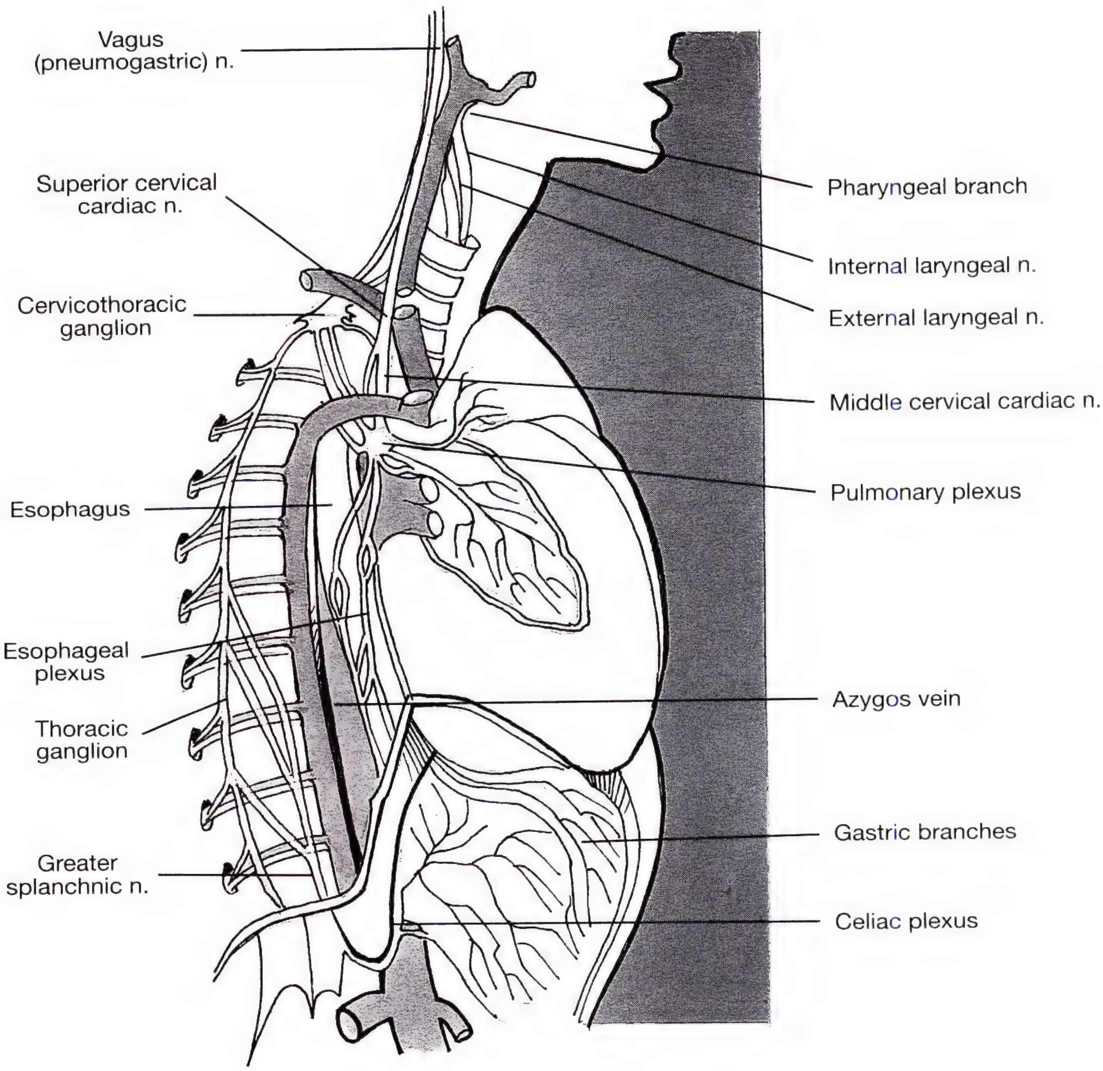


Fig. 7.5. The right vagus (pneumogastric) nerve (according to Rouvière)

by the union of the petrous portion of the temporal bone and the occiput, and at the back, it is formed by the union of the jugular and temporal fascias.

The trajectory of the vagus nerve continues as follows. A little below the jugular foramen, the vagus forms its plexiform ganglion, the fibers of which participate in the innervation of the muscles and mucosa of the pharynx, as well as in the formation of the ganglia for the carotid bodies. In the neck, the vagus nerves travel behind the internal jugular vessels and the internal carotids.

In the thorax, the right vagus nerve at first travels down to the right of the esophagus and then becomes posterior and inferior in its trajectory. The left vagus nerve lies lateral to the esophagus and then becomes anterior. In the inferior mediastinum, the right and left vagus nerves join together, and branches from this anastomosis form the periesophageal plexus. They go through the diaphragm between the crura in company with the esophagus.

The terminal branches are as follows:

- Left: From the front of the esophagus, the nerve branches out on the anterior wall of the stomach, forming the gastric plexus, with branches to the cardia of the stomach and the hepatic plexus.
- Right: From the back of the esophagus, the nerve gives rise to a posterior gastric plexus and a branch for the celiac ganglion, which joins with the celiac branch of the splanchnic nerve and forms the celiac nerve (rami celiaci vagus nerve). It also gives rise to branches for the celiac plexus, which includes the hepatic, splenic, and superior and inferior mesenteric plexuses.

Functions of the vagus nerve: The vagus nerve has three functional components: sensory, motor, and vegetative. Its sensory components transmit sensations from the skin of the posterior auricular area and from part of the external auditory meatus. Its motor fibers, together with the ninth and eleventh cranial nerves, innervate the palatal and pharyngeal muscles, playing a role in deglutition. The vagus also plays a role in phonation through its innervation of the muscles of the larynx. In its vegetative function, the vagus receives the sense of

taste from the base of the tongue, and it transmits proprioceptive information from the larynx and pharynx, thereby playing a protective role for the airway.

The pneumogastric portion of the vagus is mainly a visceral nerve, with its sensory and motor activity extending to the thoracic and abdominal viscera. It transmits the interoceptive (proprioceptive) sensations of the lungs, gastrointestinal tract, heart, and great vessels. The pneumogastric controls the smooth muscle of the lungs, the esophagus, and the intestine and plays a role in increasing biliary and gastric secretions.

Also recall that the vagus has branches that innervate the carotid sinus and thus control the arterial pressure—compression of this sinus decreases the arterial tension.

The Anti-Reflux Factors

The anatomical and physiological factors that protect against reflux include:

- the diaphragmatic sphincter
- the lower esophageal sphincter complex
  - the lower esophageal sphincter
  - the cardiac opening

THE DIAPHRAGMATIC SPHINCTER:

In addition to the closure of the muscular hiatus during inhalation, the right crus of the diaphragm plays the role of an external sphincter by compressing the lower esophageal sphincter at the end of inhalation.

THE LOWER ESOPHAGEAL SPHINCTER COMPLEX (lower esophageal sphincter and cardiac opening):

The lower esophageal sphincter:

Control of the lower esophageal sphincter: In the upper esophagus, vagal stimulation, under direction from the bulbar center, triggers the contraction of the striate musculature and assures the propagation of the peristaltic wave. The intrinsic innervation only modulates this activity. In the middle and lower esophagus, the musculature is partly under the command of intrinsic neural circuits in the esophageal

enteric nervous system; there also is vagal innervation, which can trigger a contraction.

The opening of the lower esophageal sphincter is triggered by the intrinsic stimulation of the vagus nerve or the beta adrenergic receptors. The closure of the lower esophageal sphincter is triggered by alpha adrenergic receptors. However, the abundant intrinsic innervation can, on its own, assure the contraction and relaxation.

There is also a baseline tonic activity affecting the sphincter. This baseline tonic activity maintains the pressure in the lower esophageal sphincter and is directly related to the existence or nonexistence of reflux. This tonic activity is under vagal and hormonal control and adapts to abdominal pressure. Vagal stimulation increases the baseline tonic activity, although tonic activity does persist after vagotomy.

The instillation of acid in the esophagus increases the pressure of the lower esophageal sphincter; alkalinization creates the opposite effect. A meal high in lipids and acids inhibits the pressure. One can reason that gastrin stimulates the lower esophageal sphincter because the use of exogenous gastrin increases the pressure, and the antagonists of gastrin—secretin, glucagon and cholecystokinin—inhibit the pressure in the lower esophageal sphincter.

Normally, the pressure in the lower esophageal sphincter varies from +14–55 cm H_2O, thus being clearly greater than the gastric (+8 cm H_2O) and intra-esophageal (–5 cm H_2O) pressure. From these numbers, one can see that the resting pressure above the lower esophageal sphincter is less than the fundic pressure below. However, because the lower esophageal sphincter straddles the diaphragm, lying both above and below it, the pressure varies according to the level examined.

During inhalation, the pressure decreases above the diaphragm and increases below it. The point at which the pressures reverse is called the "pressure inversion point" and is perceptibly situated in the middle of the lower esophageal sphincter at the level of the diaphragm over an area of 0.5 cm. In the case of a hiatal hernia, the pressure inversion point is situated below the lower esophageal sphincter.

Above the pressure inversion point, during the passage of swallowed products, the relaxation of the esophagus that occurs is followed by a contractile response immediately after the drainage, due to the

contractive wave. This serves as a protection against reflux. Below the pressure inversion point, the relaxation of the esophagus during the passage of swallowed products is followed by a return to the initial pressure.

The lower esophageal sphincter has the ability to constantly adapt its baseline tonic activity to the variations in abdominal pressure. The closing tension is also directly proportional to the abdominal pressure.

For example, it has been observed that when there is an increase in gastric pressure of 27 cm H_2O, the initial pressure of 21 cm H_2O in the lower esophageal sphincter will respond with a closure tension of 42 cm H_2O. However, the initial pressure in the lower esophageal sphincter is of great importance because if it is below 14 cm H_2O, the response to the increase in abdominal pressure will be equivalent, and there will be no protection against reflux.

The position of the lower esophageal sphincter (fig. 7.6): Let us recall the roles of the agents maintaining the lower esophageal sphincter and the cardiac opening in their places, including the phrenicoesophageal membrane and the muscular fibers associated with this.

In the standing position, the air pocket in the fundus has the effect of pushing the stomach down, releasing the abdominal segment of the esophagus. Thus exposed to abdominal pressure, the esophageal tube is pushed back in the diaphragmatic opening and is pressed against the wall, functionally closing it off. Therefore, the lower esophageal sphincter, when in a correct position and exposed to abdominal pressure, behaves like a functional sphincter guaranteeing the continence of the cardiac opening.

The cardiac opening (fig. 7.7):

The cardiac notch of the stomach (incisura cardiaca ventriculi) is an essential factor in the continence of the cardiac opening. The same remarks as were made for the lower esophageal sphincter also apply here for the relationship between position and function.

In conclusion

Two sphincters exist as guardians against reflux: the lower esophageal sphincter complex and the diaphragmatic sphincter. They are complementary, and the integrity of the two systems is necessary for the efficiency of their anti-reflux function.

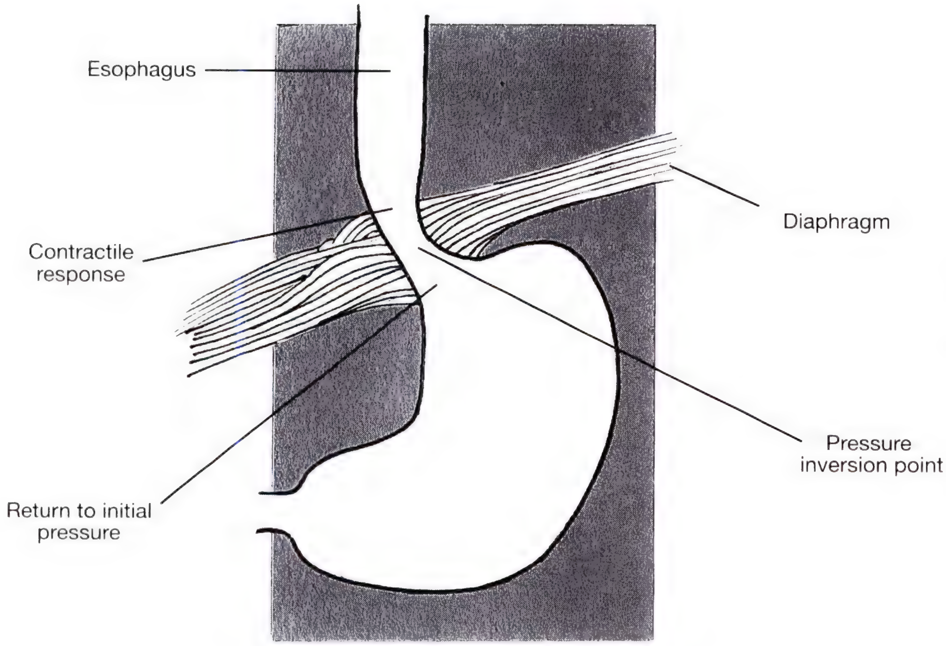


Fig. 7.6. Correct position of the lower esophageal sphincter

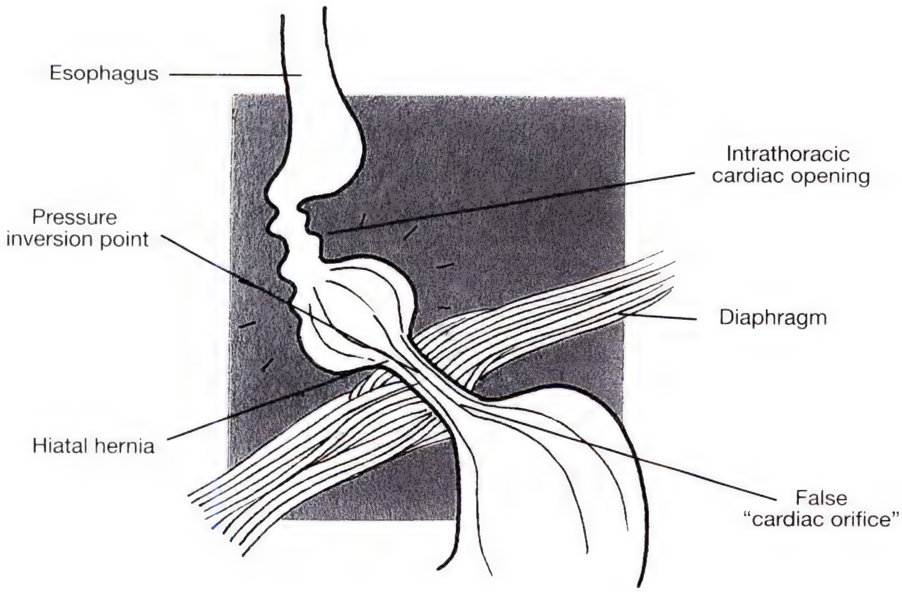


Fig. 7.7. Hiatal hernia: Pressure inversion point (P.I.P.) of the lower esophageal sphincter

RESEARCH AND CLINICAL APPLICATIONS

The Clinical Signs of Gastroesophageal Reflux

Pyrosis: a sensation of burning arising from the area of the xiphoid process radiating toward the sternum. Rarely, the radiation extends toward the neck and/or between the shoulder blades.

Regurgitation: a small quantity of acidic liquid, bitter and burning, comes into the mouth; this occurs in the absence of the strong stomach contraction that is associated with vomiting.

These two clinical signs can occur singly or together, and these manifestations are aggravated by lying down or bending the trunk forward. Other less characteristic signs should also not be forgotten. They include:

- tracheobronchial irritation, especially nocturnal
- asthmatiform crisis
- pharyngeal pain
- otalgia
- hiccups
- eructations

It is possible for reflux to exist without the presence of a hiatal hernia. Generally, however, a hiatal hernia is accompanied by reflux and is associated with diminished or absent tone in the lower esophageal sphincter. The probable explanation for this is the loss of the influence of abdominal pressure, the action of which adds to the baseline tonic activity. But we have also noted in an important number of cases of hiatal hernia that a functional area remains, and there is no reflux.

Certain hiatal hernias remain totally mute on the digestive level. We have, for example, known a patient whose only symptoms were two nocturnal asthmatiform crises within a six-month interval, and the radiological examination showed a voluminous hiatal hernia. So this lesion can leave the function of the sphincters intact. Osteopathic treatment does not claim to eliminate a hiatal hernia, especially if it is substantial, but it does claim to return function to the sphincters. The clinical signs can disappear without the gross anatomy changing, and now we can understand why.

Radiological Evaluation of Gastroesophageal Reflux

In our research of gastroesophageal reflux, we routinely performed a radiological examination on patients presenting with gastric symptomatology, particularly if they complained about pyrosis. We also took care not to overlook other signs which could make one think of reflux: tracheobronchial irritation with a nocturnal tendency, asthmatiform crisis, pharyngeal burning, otalgia, hiccups, and eructations.

The barium swallow examination was carried out as follows. The patient was placed with the head lower than the feet, lying three-quarters on his back in order to aid visualization of the cardia during the passage of the barium. If no reflux occurred spontaneously, then the patient drank water, still with his head lower than the feet, but this time, lying fully on his back.

Radiologists acknowledge that, in order to manifest the reflux, the examination may sometimes be long and difficult. Even then, the radiological examination can overlook a reflux situation, and in certain cases, it is not possible to make a radiological diagnosis. In such instances, it is necessary to use endoscopy, which confirms the esophagitis.

DIFFERENTIATING THE DIAPHRAGMATIC AND ESOPHAGEAL SPHINCTERS

It has been interesting to separate the examination of the diaphragmatic sphincter from that of the esophageal sphincter.

The diaphragmatic sphincter: For this examination, the patient was in the same standard position as for the examination of the cardiac opening (head lower than the feet, three-quarters on the back). The patient, after having taken the barium, inhaled deeply and held his breath; barium accumulated upstream of the diaphragm, dilating the epiphrenic ampulla (the dilatation at the lower end of the esophagus). If the functional integrity of the sphincter was intact, then only exhalation would allow the product to go into the stomach. This test, added to the standard examination, allowed one to conclude that there was integrity of the diaphragmatic sphincter.

The esophageal sphincter: As explained in the section on the standard examination, the patient, with his head lower than his feet, lying on his back, drank water in order to attempt to provoke reflux, if it had not occurred spontaneously. The absence of reflux in this circumstance allowed one to conclude that the esophageal sphincter was functional.

CLINICAL CATEGORIES

These examinations distinguish three broad clinical categories:

1. Complete integrity of the esophageal-diaphragmatic mechanism (fig. 7.8)

- A functional diaphragmatic sphincter:

  The barium dilates the epiphrenic ampulla and remains until exhalation.

- A functional esophageal sphincter:

  There is no observed reflux.

2. Complete loss of integrity of the esophageal-diaphragmatic mechanism (fig. 7.9)

- A nonfunctional diaphragmatic sphincter:

  The barium is not stopped in the epiphrenic ampulla by a forced inhalation.

- A nonfunctional esophageal sphincter:

  Reflux is observed.

3. Partial loss of integrity of the esophageal-diaphragmatic mechanism (two types)

A. (fig. 7.10)

- A nonfunctional diaphragmatic sphincter:

  The barium is not stopped in the epiphrenic ampulla by a forced inhalation.

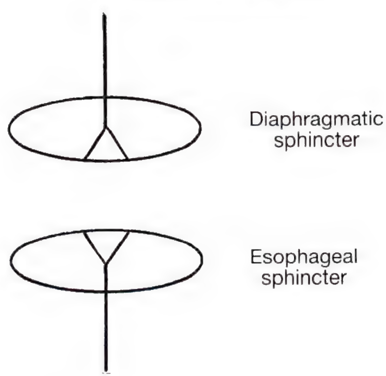


Fig. 7.8. Complete integrity of the lower esophageal sphincter

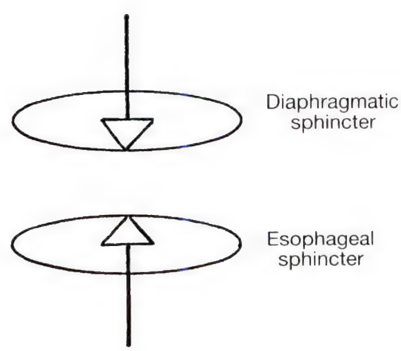


Fig. 7.9. Complete loss of integrity of the lower esophageal sphincter

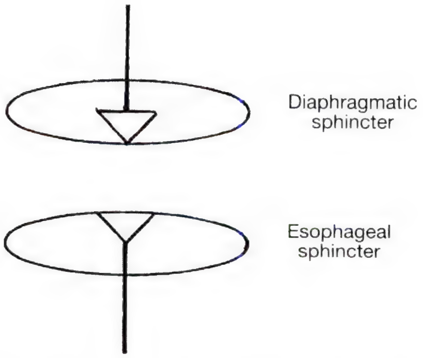


Fig. 7.10. Partial loss of integrity of the lower esophageal sphincter: nonfunctional diaphragmatic sphincter

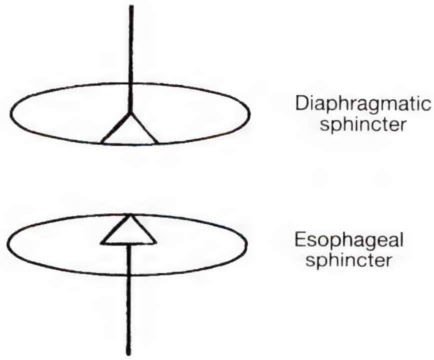


Fig. 7.11. Partial loss of integrity of the lower esophageal sphincter: nonfunctional esophageal sphincter

- A functional esophageal sphincter:

  There is no observed reflux.

B. (fig. 7.11)

- A functional diaphragmatic sphincter:

  The barium dilates the epiphrenic ampulla and remains until exhalation.

- A nonfunctional esophageal sphincter:

  Reflux is observed.

Regarding the situation described in 3A, we think of the two sphincter systems as working together—that is, if one isn't working, there will be some compromise in the function of the system. Therefore, one could speculate that there must be a leaking type of reflux where the esophageal sphincter is not able on its own to maintain a sufficient persistent action. Our observations support this, and thus it is possible to explain the presence of pyrosis without observed reflux.

In the situation described in 3B, the barium is stopped in the epiphrenic ampulla by a forced inhalation, and similarly in daily life, the reflux probably is stopped by inhalation. We then could assume here the existence of an intermittent reflux, the rhythm of which is dictated by the respiration and appearing at each exhalation.

These last cases (3A and B), in which there is a partial loss of integrity, confirm the usefulness in employing some deep respirations in the radiological examinations for the purpose of distinguishing which system is deficient. It is thus possible to orient the osteopathic normalization in a more precise way, either toward the cardiac opening or toward the diaphragm. Moreover, we have seen on many occasions that a hiatal hernia can go undetected during normal respiration and be totally evident during a deep respiration.

OSTEOPATHIC TREATMENT

The Vagus Nerves (Pneumogastrics)

The course of the vagus nerve, reviewed earlier in this chapter, allows us to be aware of the anatomical levels which need to be evaluated as possible sites of dysfunction.

THE BODY

We will not detail all the possible treatments which could be performed on the body to affect the vagus nerve. The osteopath knows them well and can apply them by recalling all the levels to be examined: the cervical column; the fascia and muscles of the neck; the upper thoracic structures, including the first ribs, clavicles, etcetera.

THE DIAPHRAGM

Treatment for this area is detailed later in this chapter in the section "The Diaphragmatic Sphincter."

THE CRANIUM

(Editor's note: These techniques should not be undertaken unless the practitioner has had specific training in cranial treatment.)

When examining and treating the cranial structures, it is always necessary to evaluate them as a whole, using a global view. However, for our purposes here, we will focus our evaluation on the occipital and temporal bones, with the intention of freeing the jugular foramen. We look for the classical lesions of internal or external rotation, flexion, extension, etcetera. Then, the sutures, particularly the occipitomastoid, need specific investigation.

Techniques for decompression and normalization of the occipitomastoid sutures

(1) Bilateral approach (fig. 7.12)

Position: The practitioner, sitting at the head of the supine patient, places both hands with the second fingers on the mastoid portions of the temporal bones and the third, fourth, and fifth fingers on the squama of the occiput on either side of the midline. The second and third fingers lie on either side of the occipitomastoid sutures.

Maneuver: This maneuver is applied bilaterally. Both hands impart a slight tension toward the back of the head, while gently separating one from the other, thus liberating the condylar area of the occiput. The second fingers separate from the third as a means of decompressing the occipitomastoid sutures. This maneuver thus frees the cranial base and the occipitomastoid sutures.

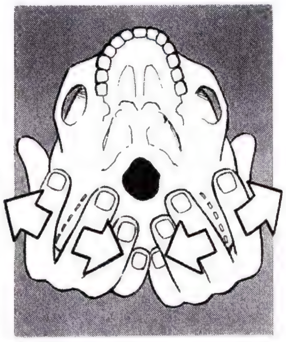


Fig. 7.12. Release of the cranial base and the occipitomastoid sutures

(2) V-spread (fig. 7.13)

Position: The practitioner, sitting at the head of the supine patient, places the second and third finger on either side of one of the occipitomastoid sutures; the other hand is placed on the diagonally opposite frontal bone.

Maneuver: The hand on the frontal bone sends out an impulse toward the opposite occipitomastoid suture; the posterior hand, as it becomes aware of the wave, separates the V that is formed by the fingers on both sides of the occipitomastoid suture.

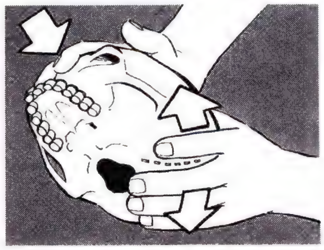


Fig. 7.13. V-spread

Petrobasilar and petrojugular release (fig. 7.14)

Position: The practitioner, sitting at the head of the patient, who is lying down, takes the zygomatic process between the thumb and index finger; the middle finger is at the level of the external auditory meatus. The fourth and fifth fingers are placed on either side of the mastoid process. The other hand cradles the occiput in its palm.

Maneuver:

- For *temporal-occipital* decompression, the temporal hand exerts a tension laterally, carrying the temporal away from the occiput. The occipital hand exerts a tension in the opposite direction.

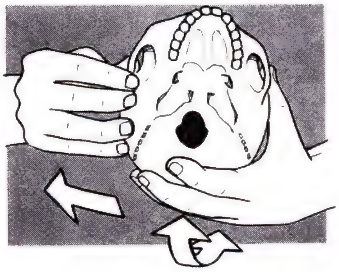


Fig. 7.14. Petrobasilar and petrojugular release

- The practitioner looks for the balance point between flexion and extension of the occiput with the temporal as a means of normalizing the *petrobasilar* relation.
- The practitioner looks for the balance point between external and internal rotation of the temporal bone as a means of normalizing the *petrojugular* relation.
- In complex cases, the technique of "pulling the ear," as described by Dr. Upledger, can be effective.

Lower Esophageal Sphincter, Cardiac Opening, and Abdominal Pressure

In this chapter, we have discussed how the variations in position of the lower esophageal sphincter and the cardiac opening create modifications in the pressure at these levels. We have also seen how abdominal pressure fulfills the function of an external sphincter on the lower esophageal sphincter and affects its tonic activity, inducing perpetual adaptation.

The full value of osteopathic treatment can be obtained by balancing these various factors among themselves through normalization of the gastrointestinal tract. Refer to the normalizations described in chapter 6.

The Diaphragmatic Sphincter

The diaphragm, when disturbed in its function, cannot fulfill its role of being a gastroesophageal external sphincter. Moreover, a diaphragm disturbed in its function can disturb, in turn, the function of the vagus nerve.

Attachments of the diaphragm

All attachments of the diaphragm to the body wall should be the object of a meticulous investigation:

- the ribs
- the sternum
- the thoracolumbar junction
- the lumbar vertebrae (remembering the possible mechanical consequences of the psoas muscle on the pelvis and lower limbs)
- the gastric-phrenic-mediastinal-vertebral-cranial chain

The fascial normalization of the thoracic diaphragm

This local fascial approach is accomplished by means of a balancing act between the diaphragm and the upper dorsal area (fig. 7.15). In this maneuver, keep in mind the vertebral insertions of the esophagus, through the intermediary of the prevertebral fascia, from the base of the cranium down to T4.

Position: The patient lies on the back; the practitioner is at the head of the patient, one hand in the upper dorsal area, the other placed on one or the other arch.

Maneuver: The fascial balance is sought by beginning with the caudal hand making a movement, which is at first transverse and then cephalocaudal. One will progressively feel the "passive" area (the upper dorsal) respond to this initiation in an identical direction; progressively, the two hands, which both become passive, will be able to feel the establishment of a harmonious fascial movement between the areas.

Fig. 7.15. Fascial normalization for the diaphragm

Advice for the Patient

Useful advice for a patient suffering from gastroesophageal reflux:

- avoid going to bed within three hours following a meal
- raise the head end of the bed by 15–20 cm
- preferably sleep lying on the left side of the body
- give up tobacco completely
- avoid drinking coffee, tea, and alcohol on an empty stomach
- avoid eating between meals (especially sweets)
- avoid leaning forward

In conclusion: The osteopathic treatment of hiatal hernia and gastroesophageal reflux supports the concept of viewing the body with a global approach. It shows that osteopathy may be used to treat not only the head and body but also the viscera. The osteopath must keep in mind that the intention is not to reduce the hiatal hernia; subsequent radiological examination will probably show its persistence. By restoring physiologic function, however, the patient will often regain a more normal "digestive life." The osteopath thus contributes to the relief of the symptoms of a condition which can profoundly disturb a patient's general well-being.

part four

Biometric Analysis of the Visceral Dynamics

chapter **8**

Introduction to the Research

Our objective in undertaking this research was to scientifically and statistically describe as precisely as possible the biodynamic viscerodiaphragmatic function. This function, in which the abdominal viscera are shifted under the influence of diaphragmatic pressure, has been previously described by other authors, but has not been defined in so precise a way. The presence of the visceral dynamics is important because osteopathic concepts hold that the homeostasis of the abdominal organs depends on this diaphragmatic-visceral functioning. Therefore, any disturbance in these biodynamics, which could result from an alimentary, traumatic, or psychological stress, seems to be able to upset the homeostasis and lead to illness.

For this study, the gastrointestinal-tract biodynamics were analyzed through the use of X-rays, while echography was used to analyze the biodynamics of the liver, kidneys, pancreas, and spleen. The process involved the analysis of more than 3,000 X-ray negatives and echographs from 24 hours of video recordings.

In this part of the book, we present a synopsis of our study. We will describe the experimental methodology, statistical evaluation, sources of error, and the detailed dynamic of the organs. A general summary of the dynamics of the organs can be found in chapter 3.

(Note: The complete study can be found in our thesis presented in January 1988—see Selected Bibliography.)

METHODOLOGY

In all the studies, we decided to have the patient standing upright, which reproduces the conditions of how the average person spends the majority of his/her day.

A strict protocol was followed, which included:

- Recording the X-ray examinations (fig. 8.1): The examinations were recorded on videotape.

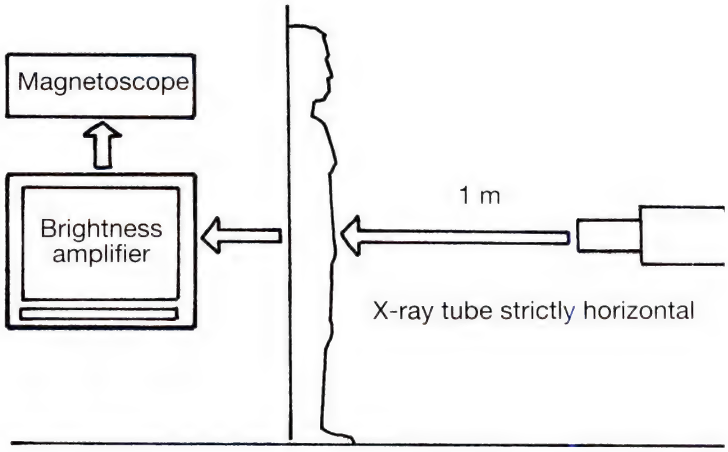


Fig. 8.1. Recording of the examinations

- Taking the images (fig.8.2): The videotape of the X-rays was viewed on the screen of the echographic machine, the camera of which allowed us to capture the images, one in inhalation, the other in exhalation. From this, we obtained a sheet with six images, which were numbered, sectioned, and classified.
- Reproduction of the images (fig. 8.3): Using a photo enlarger (Krokus 9 × 6), the pictures were lined up on the window of the lens and were projected onto paper. From this projection, the outline of a given organ was reproduced in the position of inhalation and exhalation on the same schema.
- Analysis on the graph (fig. 8.4): On the graph, which was connected to a computer, the outline of the organ was traced in the two positions (inhalation and exhalation) with the help of a magnetic pencil, which then allowed for analysis of the information.

For each analyzed schema, the computer recorded:

- the horizontal shifting (measured in screen units);
- the vertical shifting (measured in screen units);
- the variation in the angle of inclination (measured in degrees);
- the variation in the number of dots composing the circumference and the surface of the drawn organ.

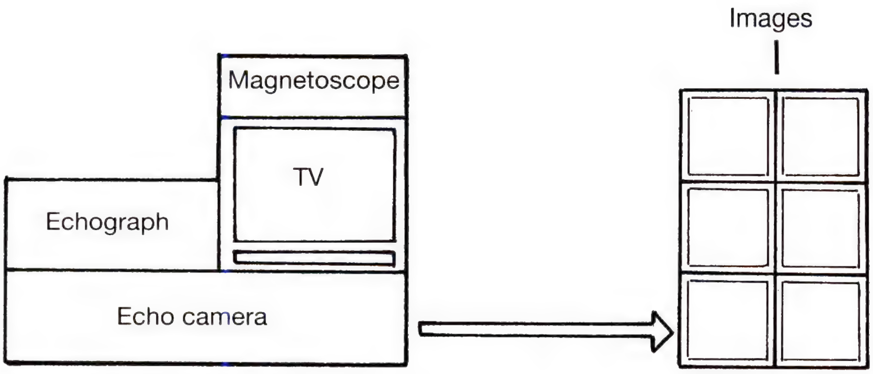


Fig. 8.2. Taking the images

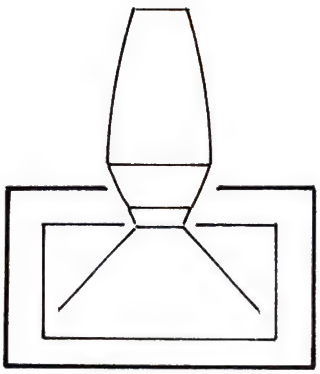


Fig. 8.3. Reproduction of the images on the enlarger

Calculation of the scale. For the *radiographic* examinations: An exact scale was able to be established by placing a graduated ruler in the X-ray field. In the analysis of the graph, the presence of this ruler enabled us to say that, for the chosen enlargement, the screen unit was equal to an exact number of millimeters. *(Note: The averages given hereafter are therefore expressed in exact millimeters and degrees.)*

For the *echographic* examinations: The scale on the echographic machine was positioned on "scale 1 ×," and the reproduction of the picture by the enlarger was also at scale 1 ×; therefore, a distance of 40 millimeters measured by the echograph and transferred onto a tracing by the enlarger is equal to 40 millimeters.

Two squares, at a horizontal distance of 40 millimeters, were drawn on the same tracing and reproduced on the graph. The analysis of the computer gave a reading of 28 dots for this distance, which meant that a horizontal shifting of 28 screen dots was equal to 40 millimeters. The horizontal shifting of a screen dot is equal to: 40/28 = 1.428 mm.

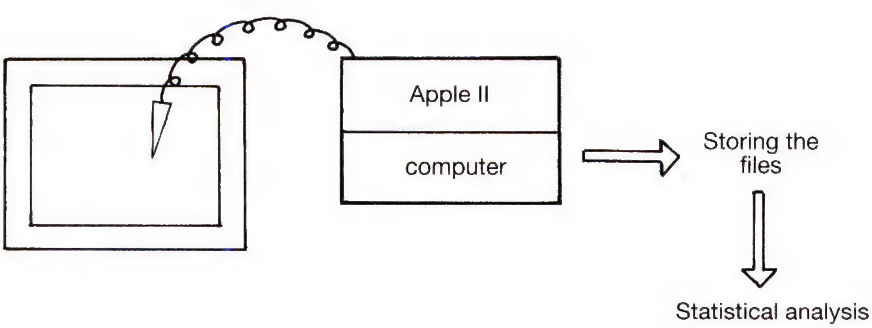


Fig. 8.4. Analysis on the graph

Two squares, at a vertical distance of 35 millimeters, were drawn on the same tracing and reproduced on the graph. The analysis of the computer gave a reading of 23 dots for this distance, which meant that a shifting of 23 screen dots is equal to 35 millimeters. The vertical shift of a screen dot is equal to: 35/23 = 1.521 mm. Therefore, we determined the scale to be 1.5. *(Note: The averages and ranges given in the echographic analysis have therefore been obtained by multiplying the given millimeters by 1.5. The given degrees are at a scale of 1.)*

Statistics

The data put into computer memory enabled us to achieve a statistical analysis.

Table 1: For a given organ, the parameters analyzed on the abscissa and ordinate are selected by the operator. Using the averages and the standard deviations, we can see the correlation between: (1) horizontal and vertical shift, (2) horizontal shift and variation in the angle of inclination, and (3) vertical shift and variation in the angle of inclination.

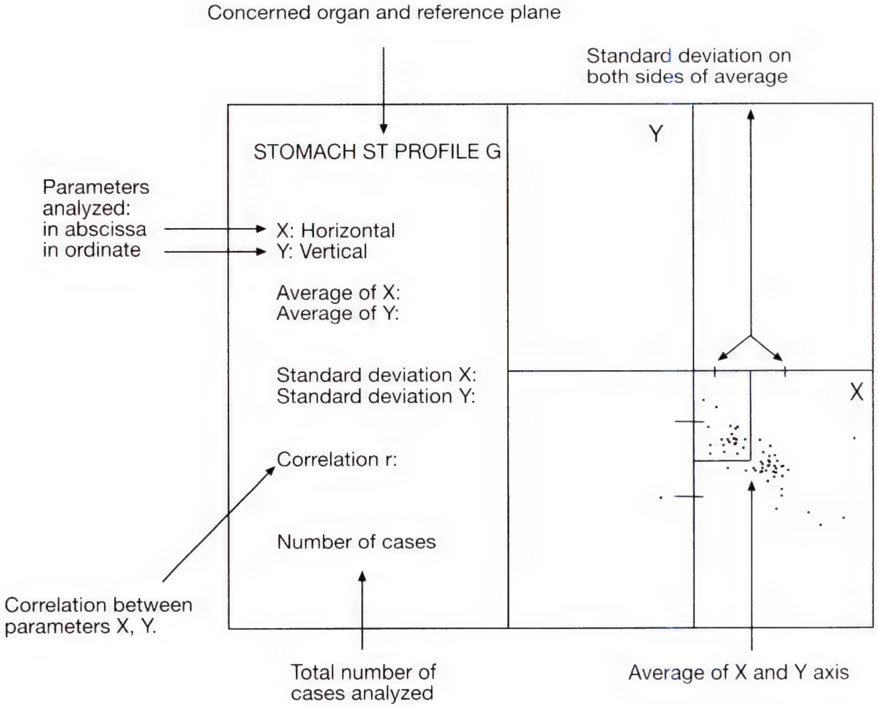


Table 1. Averages and correlations

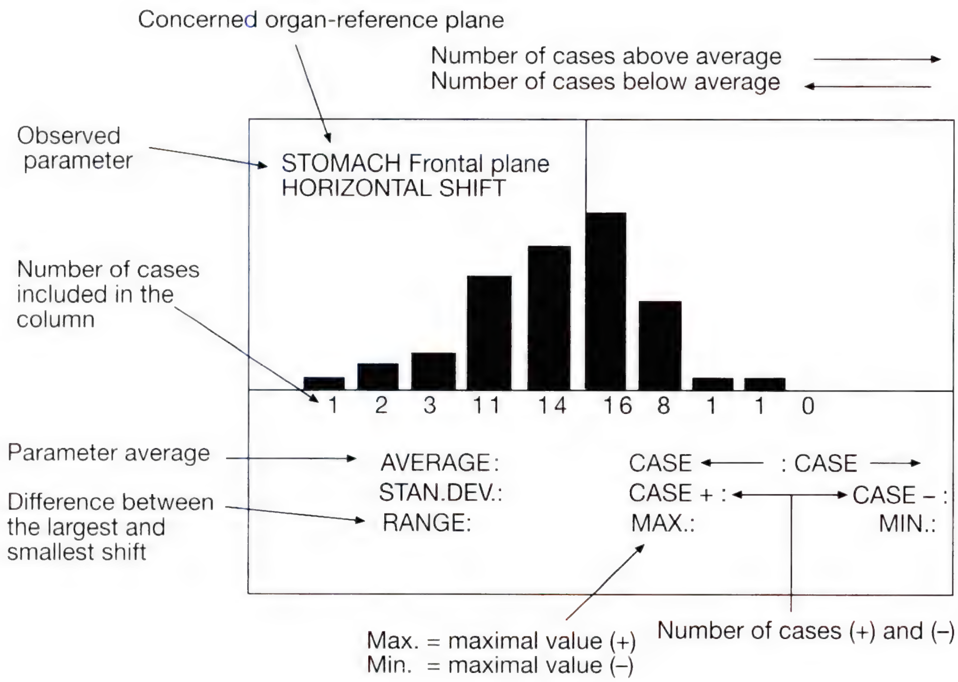
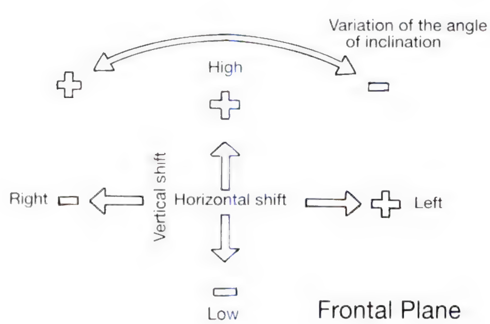
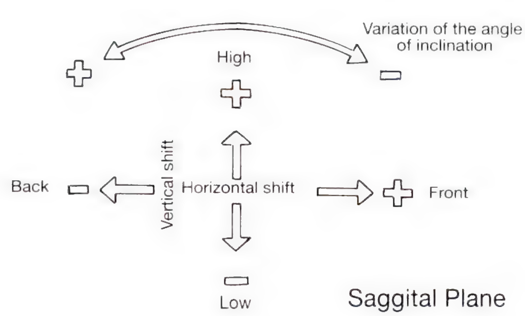


Table 2. Distribution and histogram

Table 2: The analysis of the characteristics of each parameter for a given organ and plane are shown. The histogram allows us to visualize the distribution of cases around the average. One column has the value of one-half standard deviation. We are thus able to observe the distribution over five one-half standard deviations on either side of the average.

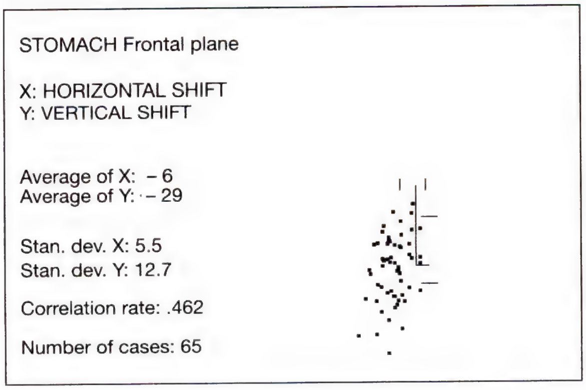
Table 3: This gives the complete results serving as the basis for statistical discussion. The sign given to the average (+ or –) indicates the direction of the average shift. The schematic for this is:



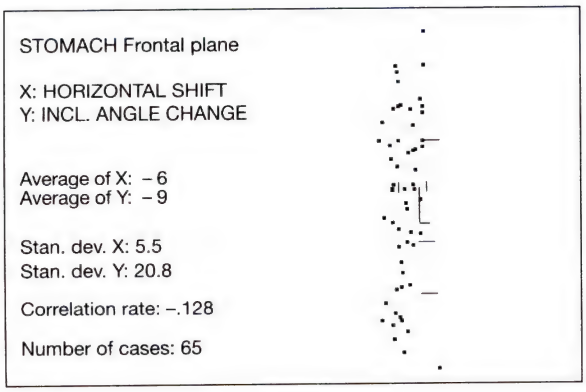


Diagrams A1, A2, and A3 in table 3 show, in addition to averages, the standard deviations, the number of cases studied, and the correlations between the two chosen parameters. We have used the Student

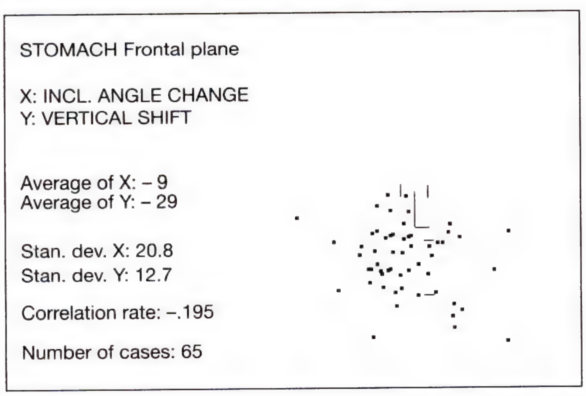
A1



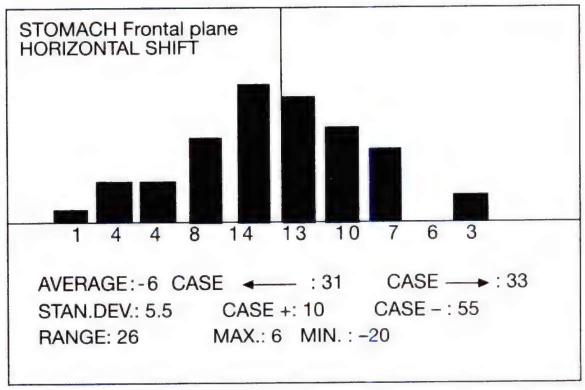
A2



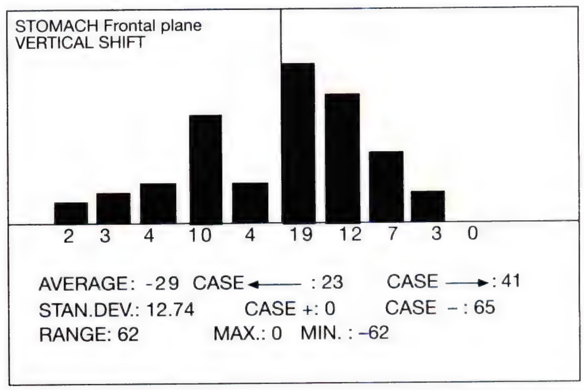
A3



B1



B2



B3

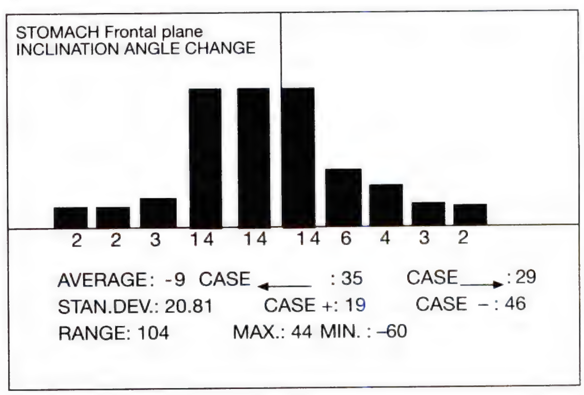


Table 3. Graphic analysis

test, which permits a reliable statistical study even when the sample is less than 30. It enables us to make a comparison of the averages within an identical population (a comparison of different parameters on a like population). The average amount of movement marked along the X and Y axes and the clouds of dots enable us to “visualize” the significant tendencies.

Diagrams B1, B2, and B3 in table 3 study the characteristics of each parameter. The histogram determines the distribution by one-half standard deviations. This distribution is also calculated by the division of cases situated below and above the average. Furthermore, the total number of cases (+) and (–) shows if the general tendency is in the direction of the average shift. The maximum and minimum values enter into the discussion in determining certain tendencies. These different elements, summarized very concisely, are thus used in order to try to determine the direction of the shifts.

■ ■ ■

The methodology used for carrying out the X-ray and echographic examinations is discussed in the next two chapters.

Dynamics of the Gastrointestinal Tract

Radiological examinations were used to determine the dynamics of the various components of the gastrointestinal tract.

RADIOLOGICAL EXAMINATIONS OF THE GASTROINTESTINAL TRACT

Radiological Method

The patient was upright, standing firmly against the table, breathing slowly without lifting the shoulders. X-rays were taken with the patient facing forward and also in profile, with the left side against the plate. In order to keep all references uniform, no other positions, such as a three-quarter view, were used. The X-ray tube used for these examinations was the "Table Prestilix 1600" model. A minimal distance of one meter was used, and the tube was horizontal for all patients. The brightness amplifier used was a Hyperlux, 23 centimeters, one output, two fields.

The recording of the examinations, their reproduction and analysis, and statistical parameters are discussed in chapter 8.

Examination Technique

The patients arrived on an empty stomach between 7:00 and 8:30 a.m. Their age range was from 20 to 50 years old, and their height ranged from 1.45 to 1.80 meters. Their weight ranged from 45 to 90 kilograms, and 40% of the subjects were female.

In order to stop peristalsis, at the beginning of the examination the radiologist administered 0.5 mg of glucagon for the study of gastrointestinal transit and 2 mg of glucagon for the examination of the colon. Our observations were made at the recovery of peristalsis in order to come as near as possible to the natural conditions of the transit. The transit of the oral barium enabled the study of the stomach, duodenum, jejunum, and ileum. The barium enema enabled a study of the colon.

All the patients had come for X-ray examinations because of gastrointestinal symptomatology. The extreme cases, such as those with severe pathologies, surgical intervention, etcetera were excluded for the purposes of this statistical study.

POTENTIAL SOURCES OF ERROR

Each stage of the examination contained possible sources of error. It was necessary for us to identify them in order to minimize them.

Reproducibility of Organ Movement

The fundamental question we asked ourselves for this study was: Did these displacements create a chaotic shift, or is there a repetitive character to the movement for the same organ in the same patient? Our study supported the finding of a reproducible movement for each organ.

The shifts in the geometric center of the projected surface and the rotations around the inertial center constituted the features to be measured. They were influenced or affected by the shift of the organ, the deformation of the organ, and the deformation of the projection.

TEST FOR ERROR (GRAPH 1)

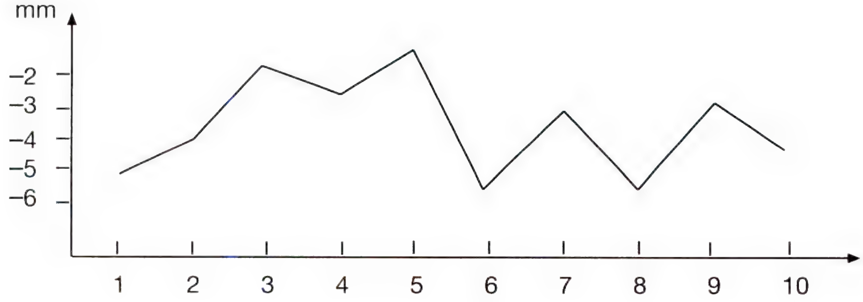
We analyzed the dynamics of one of the organs (on this occasion, the gastric fundus in the frontal plane) in one subject during a series of ten inhalation movements. For the rest of the gastrointestinal tract in the frontal plane, we observed three inhalation movements. We then made the same calculations as for the gastric fundus.

Graph 1 shows ten movements of the gastric fundus in the frontal plane in the same patient. In examining this data, we noted that the range, which is the difference between the largest and the smallest values observed, was very sensitive to aberrant values. We also calculated the standard deviation, which gives us an idea of the dispersion around the average.

From this analysis, it is clearly apparent that the variations around the average are small (the standard deviation and the range are small in relation to the averages). Also, there is a repetitive character to the movement—that is, the organ always shifts in the same direction. The

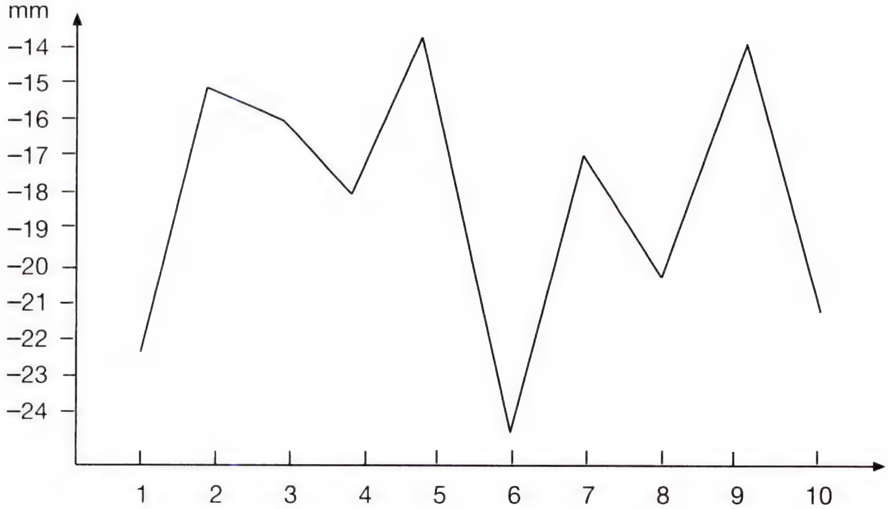
Horizontal shift from left to right:

- average: –3.8 mm
- range: 4 mm
- standard deviation: 1.26



Vertical shift from above to below:

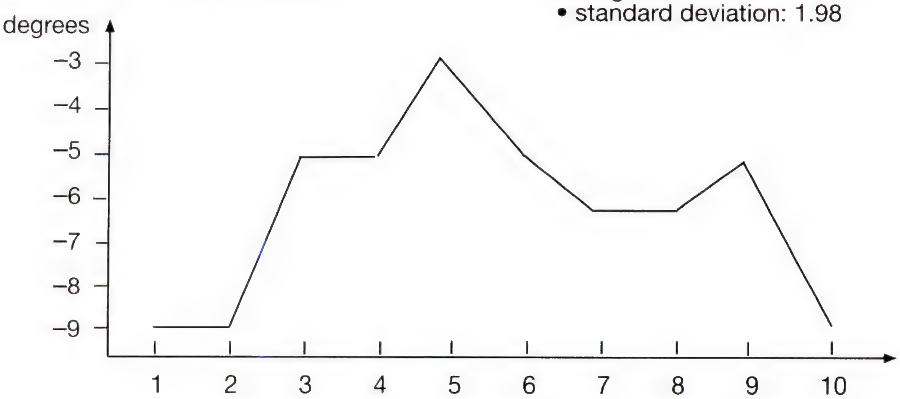
- average: –18.2 mm
- range: 4 mm
- standard deviation: 3.33



Graph 1. Ten movements in the same patient of the gastric fundus in the frontal plane

Variation in the angle of inclination from right to left:

- average: –6.2°
- range: 6°
- standard deviation: 1.98



slight variations in the results are due to differences in the inhalation movements.

In conclusion: At this stage of the study, the statistical results enabled us to consider that when it exists, the movement is repetitive over time and presents the same variations in horizontal, vertical, and inclinational shifts. There is a coherence to the dynamics for a given organ.

Fixed Elements

The X-ray tube: The tube was always positioned in the same way with no variation in its level.

The patient: Even though all the examinations were carried out using the same strict conditions, we had to ensure that any small oscillations the patient made would not induce a visceral shift that did not represent the organ's "dynamics."

TESTS FOR ERROR (GRAPH 2)

The L2 vertebra in both frontal and profile projections was chosen arbitrarily as a reference mark in 30 patients taken at random. The analysis was carried out according to the same criteria and methodology as for the viscera. We considered two standard deviations on both sides of the average, which encompasses 95.45% of the population (if the curve is Gaussian and statistically significant).

Calculation example:

Frontal plane: horizontal shift of L2

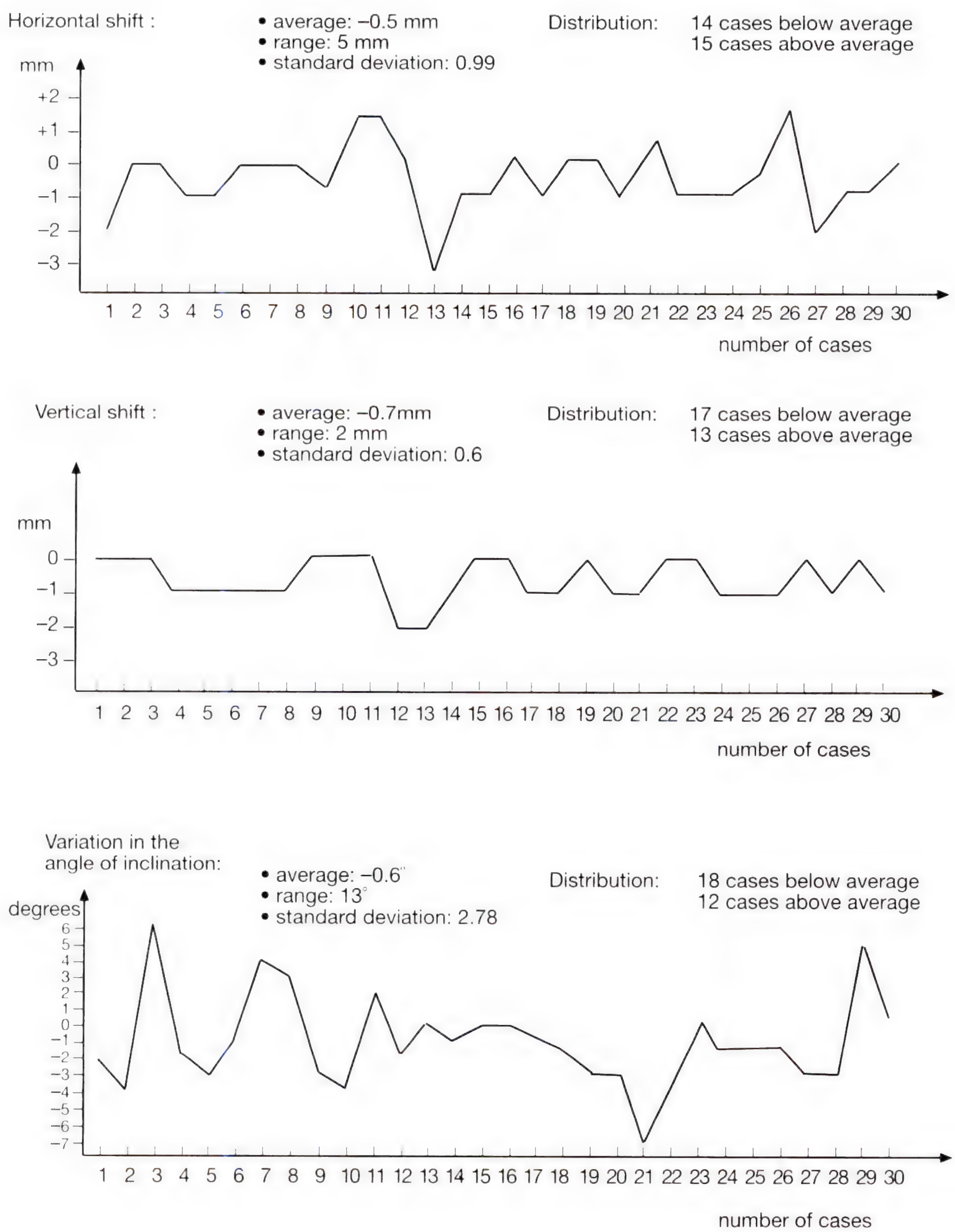
Two standard deviations: 0.99 x 2 = 1.98

Maximum shift:

$$-0.5 \text{ mm} + 1.98 = 1.48 \text{ mm}$$

$$-0.5 \text{ mm} - 1.98 = -2.48 \text{ mm}$$

We estimated that the maximum horizontal shift attributable to the movements of the patients would be 2.5 mm above or below the average. The same type of calculation was made for the other parameters in the two different planes (frontal and sagittal). The results obtained gave us the margin of error to be considered for the involuntary shifts of the patient.



Graph 2. Shift of L2 in the frontal plane

Taking the Pictures

Between the video image and the pictures obtained by the echographic camera, modifications cannot, technically speaking, be produced. Therefore, this does not represent a potential for error.

Reproduction of the Graphic Diagram

The equipment: The enlarger, which was only used for this purpose, was fixed so the size did not vary.

The reproduction: A poor superimposition of the two negatives constituted the greatest risk of error.

TESTS FOR ERROR

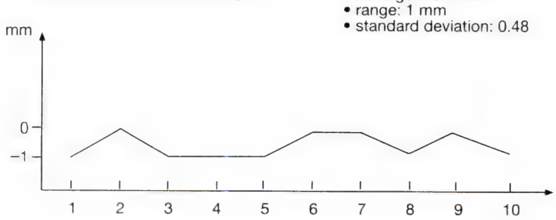
Two tests were carried out:

(1) Fixed point on the X-ray table (graph 3): A fixed reference mark placed on the X-ray table was analyzed using two X-rays, following the same parameters and methodology as for the visceral dynamic. Two different reference shapes were analyzed: round and oval. We found there was an almost perfect superimposition on all the X-rays because the ranges and the averages were on the order of zero, whatever the shape of the reference.

(2) Successive reproductions of the same schema (graph 4): The operation of reproducing the schema for a given viscera (in this case the gastric fundus in the frontal plane) was repeated ten times. The analysis was a double verification because it allowed us to evaluate the influence of the manipulator on the placing of the X-ray on the enlarger and the transfer to the graph. As was done with the "Fixed Elements" (graph 2), a margin of error was calculated. The analysis of graph 4 shows clearly that the variations are minimal.

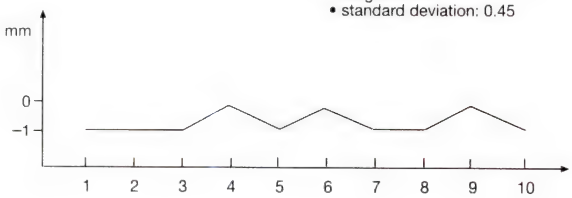
Horizontal shift from left to right:

- average: –0.7 mm
- range: 1 mm
- standard deviation: 0.48



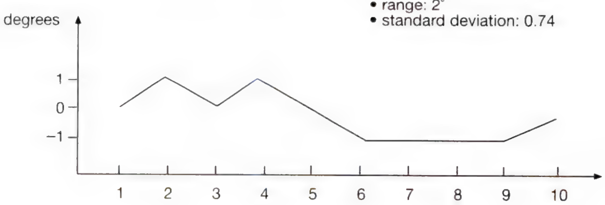
Vertical shift from above to below:

- average: –0.7 mm
- range: 1 mm
- standard deviation: 0.45



Variation in the angle of inclination:

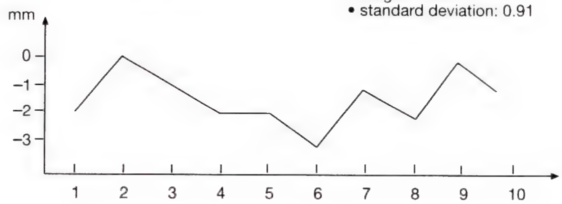
- average: –0.3°
- range: 2°
- standard deviation: 0.74



Graph 3. Fixed point table: oval shape (ten cases)

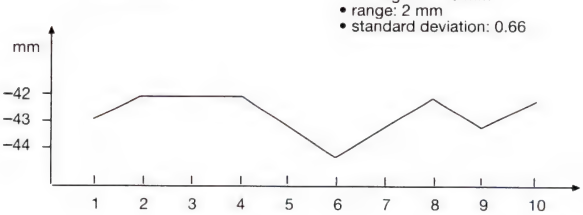
Horizontal shift:

- average: –1.4 mm
- range: 3 mm
- standard deviation: 0.91



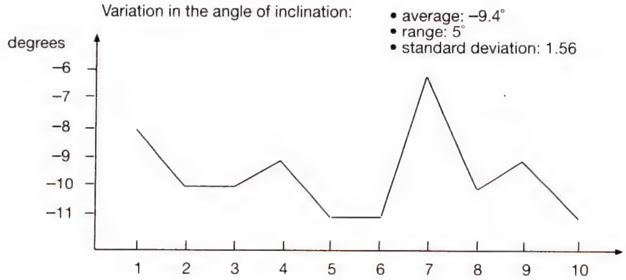
Vertical shift:

- average: –42.6 mm
- range: 2 mm
- standard deviation: 0.66



Variation in the angle of inclination:

- average: –9.4°
- range: 5°
- standard deviation: 1.56



Graph 4. Ten reproductions of the same X-ray (gastric fundus in the frontal plane)

Table 4. Frontal plane

	Horizontal shift	Vertical shift	Variation in the angle of inclination
Average	– 0.5 mm	– 0.7 mm	– 0.6°
Range	5 mm	2 mm	13°
1 Standard deviation	0.99	0.61	2.78
Maximum shift attributable to error (more or less than average)	2.5 mm	2 mm	6° for L2 5° for reproduction

Table 5. Sagittal plane

	Horizontal shift	Vertical shift	Variation in the angle of inclination
Average	– 0.8 mm	– 0.5 mm	– 0.8°
Range	21 mm	3 mm	15°
1 Standard deviation	3.34	0.76	4.58
Maximum shift attributable to error (more or less than average)	7.5 mm	2 mm	9° for L2 5° for reproduction

Sources of Error—General Conclusions

RECAPITULATIVE TABLES

Tables 4 and 5 show the values calculated in the different error tests which were used to determine the margin of error for the statistical study.

The reading of these tables enables us to draw some conclusions. The statistical averages of the shifts due to different manipulations and involuntary movements of the patient are all close to zero. This proves that the error is due to chance and therefore only slightly influences the average of the parameter studied.

In our study, if the average of the examined parameter was some number other than zero, we assumed that a dynamic did indeed exist. After a statistical analysis based on the data collected, the direction of the shift was defined.

If the average of the studied parameter was equal to zero, there could still be a shift of the viscera if the standard deviation (the variation around the average) was greater than the values attributable to error in each case. In our study, these standard variations in the frontal plane were 0.99 for the horizontal shift, 0.61 for the vertical shift, and 2.78 for the variation in the angle of inclination. In the sagittal plane, the standard deviations were 3.34 for the horizontal shift, 0.76 for the vertical shift, and 4.58 for the variation in the angle of inclination. The presence of figures less than these led us to be careful in our interpretation and did not allow us to confirm "objective" visceral dynamics based only on the standard deviation.

In the presence of an average equal to zero and a standard deviation situated within the margin of error, we examined the range, which represents the difference between the extreme values of the visceral shift (equal to three standard deviations). We found that if the range was greater than those values attributable to error, we could assume that a shift did exist, although it was weak (which explains the small standard deviation). The greater extreme variations did serve as some proof of the dynamics. If the range fell within the margin of error, it could be said that no interpretation stands out from the study and that one cannot conclude that there is an "objective" dynamic by our means.

COMPLEMENTARY TEST OF RELIABILITY

This test looked at the correlations between the vertical shifts in the sagittal and frontal planes. It served as another test of the reliability of the method. The test consisted of comparing the vertical shift of the face and the profile (shift in the frontal and sagittal planes) of a given organ in an identical group of patients. If our method was valid, we knew we should obtain a significant correlation.

This test did turn out to be positive because we found highly significant correlations for nearly all levels of the gastrointestinal tract, except for: (1) the *rectum*, where the shifts, so very minimal, fell within the margin of error; and (2) the *jejunum* and *ileum*, when each was compared with the profile of the small intestine because it was not the same "projection" studied.

A special remark should be made about the duodenum and the sigmoid, which, when analyzed globally, presented, respectively, significant and highly significant correlations; however, when their segments were analyzed separately, only the first and the fourth parts of the duodenum showed a highly significant correlation. It thus seems that, for certain segments, one is not able, by our means, to reproduce exactly the same level in the frontal as for the sagittal planes, this probably being due to the sinuous trajectory of the organ. Nevertheless, if this observation calls for caution in a comparative analysis of the frontal and sagittal planes, it does not diminish in any way the value of the precise plane-by-plane study of these levels.

Based on the tests for error carried out and given the precautions proclaimed in the analysis, we can conclude that there is reliability in the methodology for the radiological examinations.

THE VISCERAL DYNAMICS

THE EXISTENCE OF THE DYNAMICS

It has been demonstrated that the reference points do not move. (The external reference points are the X-ray tube and the X-ray film, and the internal reference point is the patient at L2.) Because the reference points can be considered essentially fixed, it must therefore be that there are some forces that cause the viscera to shift.

THE DYNAMIC FORCES

The dynamic forces are the *force of gravity*, *reaction forces*, and the *muscular forces* (fig. 9.1).

The force of gravity presses on each organ, which in turn resists this pressure due to the reaction forces, which include those from the organ itself as well as those coming from bone structures, other organs, and the fascia.

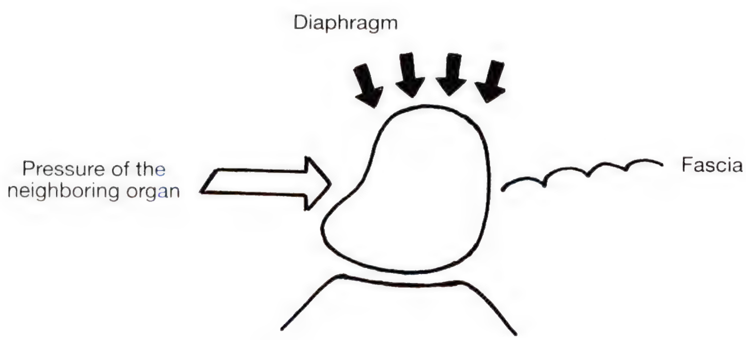


Fig. 9.1. Some of the forces acting on an organ

The muscular forces principally come from the diaphragm. These muscular forces modify the effects of the other forces. They are "balanced" inferiorly by the pelvic muscles, anteriorly by the abdominal muscles, and posteriorly by the quadratus lumborum, etcetera.

RELATIVE DEFORMATION

The relative deformation of the organs is another consequence of the pressure of the dynamic forces. The schemes and video films show a coherence at this level because we did not observe an isolated or unusual deformation but a repetitive one, as the statistical analysis on ten movements of each organ proved. Moreover, this deformation is minimal compared to what one would imagine possible in the case of a hollow organ. In fact, the organ always seems to adapt itself in an identical way to the forces to which it is submitted (fig. 9.1).

BIOMETRIC ANALYSIS OF THE GASTROINTESTINAL DYNAMICS

Please note the following conventions for the presentation of the gastrointestinal dynamics:

- The shifts are always described for the organ's movement from the position of *exhalation toward inhalation*.

- The direction of the shifts is in reference to the patient; for example, a shift to the right occurs to the right side of the patient.

- The averages, which are given in degrees and millimeters, are expressed as real values. The averages are given as a general indication of the magnitude of the movement, but they do not constitute the essential point of the statistical discussion. *(Note: The essential point is the direction in which the organ is displaced. When this parameter of the movement is disturbed, functional problems can arise. What the magnitude of the movement is has less importance. Also, a greater sampling size would be needed in the study for these numbers to have a strong significance.)*

- The percentages of cases showing each movement are given in order to support our conclusions; they do not, however, constitute the only criteria for these conclusions. *(Note: We did not wish to lose the reader in the maze of a statistical discussion; for the complete discussion, reference is made to our master's thesis in osteopathy, 1988—see Selected Bibliography.)*

- As regards the figures:
    - the black arrows (➡) indicate the direction of a clear shift;
    - the white arrows (⇨) indicate a tendency;
    - the white arrows going in opposite directions (⬄) indicate that a dynamic does exist, but that it can move in either direction;
    - figures are given for the number of cases analyzed for each organ in the indicated plane.

Stomach (figs. 9.2 and 9.3)

GASTRIC FUNDUS

(frontal plane: 65 cases) (sagittal plane: 59 cases)

The gastric fundus moves in an oblique plane that goes down, to the front, and to the right. It descends (100%; avg. 29 mm), advances (98%; avg. 20 mm), and shifts to the right (85%; avg. 6 mm). It tends to incline from the front to the back in 63% of the cases (with a max. value of 44°), and in 37% of the cases it inclines from the back to the front (with a max. value of 7°). It tends to incline from the right to the left in 71% of the cases; in 3% of the cases, it does not shift; and in 26% of the cases, it shifts in the opposite direction (avg. 9°). It should be noted that this movement is more a spreading out due to diaphragmatic pressure rather than due to a real inclination. According to our findings, the more the gastric fundus descends, the more it goes to the right, advances, and tends to incline toward the back.

BODY OF THE STOMACH

(frontal plane: 64 cases) (sagittal plane: 57 cases)

The body of the stomach moves in an oblique plane down and to the front. It descends (87.5%; avg. 8 mm), advances (88%; avg. 9.5 mm), and shifts either to the right (47%) or to the left (44%). In 9% of cases, it does not make a horizontal shift in the frontal plane. It tends to incline from left to right (70%; avg. 5.2°) and from back to front (65%;

Fig. 9.2. Stomach: frontal plane

Fig. 9.3. Stomach: sagittal plane

avg. 3°). According to our findings, the more the body of the stomach tends to incline to the right, the more it shifts either to the right or to the left; and the more it descends, the more it advances.

GLOBAL ANALYSIS OF THE STOMACH

The analysis presented in the preceding sections indicates, based on the averages observed, that there is a three times greater descent of the gastric fundus than of the body of the stomach. Thus, the stomach shortens in its long axis, "curling up" on itself during inhalation. Because the inclination of the body of the stomach and the gastric fundus occur in opposite directions, both in the frontal and the sagittal planes, a "torsion" of the stomach is created. According to our findings, the more the stomach descends, the more it advances.

Duodenum (figs. 9.4 and 9.5)

DUODENAL BULB

(frontal plane: 59 cases) (sagittal plane: 27 cases)

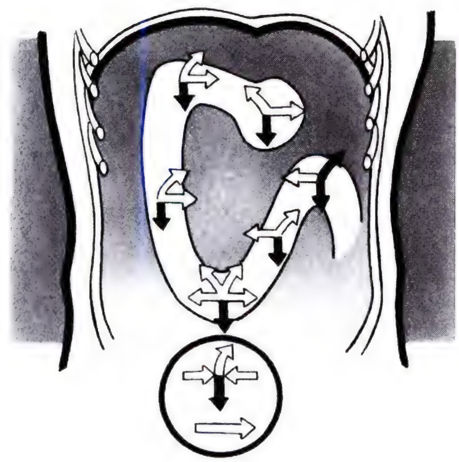
The duodenal bulb moves in an oblique plane downward, forward, and to the left. It descends (95%; avg. 8.9. mm), advances (89%; avg. 6.8 mm), and tends to shift toward the left (70%; avg. 1.9 mm). It shows a slight tendency to incline toward the right (63%; avg. 3.3°) and the front (74%; avg. 5.8°).

FIRST (SUPERIOR) PART OF THE DUODENUM

(frontal plane: 54 cases) (sagittal plane: 30 cases)

The first part of the duodenum moves in an oblique plane downward, to the front, and to the left. It descends (91%; avg. 9.7 mm), advances (90%; avg. 7.5 mm), and tends to shift toward the left (72%; avg. 2.6 mm). It shows a slight tendency to incline toward the left in 61% of the cases. In 39% of the cases, it goes in the opposite direction, but to a far lesser degree. The average is 3.8°. It tends to incline toward the front in 74% of the cases, 23% go in the opposite direction, and 3% do not show a shift. The average is 5.5°.

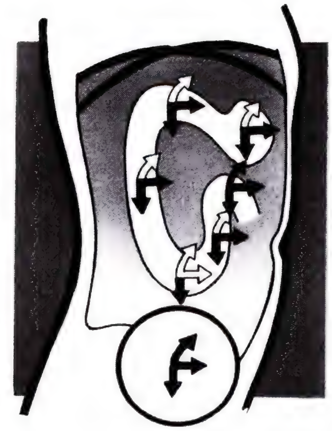
Right



Left

Fig. 9.4. Duodenum: frontal plane

Back



Front

Fig. 9.5. Duodenum: sagittal plane

SECOND (DESCENDING) PART OF THE DUODENUM

(frontal plane: 33 cases) (sagittal plane: 32 cases)

The second part of the duodenum moves in an oblique plane downward, to the front, and to the left. It descends (94%; avg. 7.2 mm), advances (84%; avg. 5.1 mm), and tends to shift toward the left (67%; avg. 2.1 mm; max. value 16 mm). In 33% of the cases, it goes in the opposite direction, but shows a weak maximal value of 6 mm. It shows a slight tendency to incline to the side. In 61% of the cases, it inclines to the left. In the cases where it shifts to the right, it does so only to a small degree. The average is 3.4°. It also shows a slight tendency to incline forward or backward. In 66% of the cases, it inclines forward. In 31% of the cases, it inclines backward, but only to a small degree. The average is 4.3°. 3% of the cases do not shift.

THIRD (HORIZONTAL/INFERIOR) PART OF THE DUODENUM

(frontal plane: 39 cases) (sagittal plane: 34 cases)

The third part of the duodenum moves in an oblique plane downward and to the front. It descends (93%; avg. 6 mm). It shows a very slight tendency to advance (avg. 1.8 mm) in 50% of the cases (max. value 19 mm), while in the other 50% of the cases, it goes in the opposite direction (the max. value does not exceed 7 mm). The third part of the duodenum can shift either to the right (52%) or to the left (48%). It tends to incline toward the front (68%; avg. 6.5°) as well as either to the right (65%) or to the left (35%). Although we have noted that a large

percentage (65%) of the cases shift to the right, we do not consider this a significant movement because it is very small; the average is only 1.2°. The maximal values of the shift toward the right and left are similar.

FOURTH (ASCENDING) PART OF THE DUODENUM

(frontal plane: 28 cases) (sagittal plane: 28 cases)

The fourth part of the duodenum moves in an oblique plane downward, to the front, and to the right. It descends (82%; avg. 5.3 mm), advances (82%; avg. 4 mm), and shows a slight tendency to shift toward the right in 57% of the cases. 25% shift to the left, but with only a maximal value of 3 mm, which is at the limit of the margin of error that we have imposed on ourselves. 18% do not have any shift (avg. 2 mm). The fourth part of the duodenum shows a very slight tendency to incline toward the left in 50% of the cases with a maximal value of 26°. 39% incline to the right with a maximal value of 17°, and 11% do not show any shift (avg. 2.3°). We find a tendency for an inclination toward the front (71.5%; avg. 9°).

THE DUODENOJEJUNAL ANGLE

(frontal plane: 35 cases) (sagittal plane: 30 cases)

The duodenojejunal angle moves in an oblique plane downward, to the front, and to the right. It descends (86%; avg. 7.4 mm), advances (90%; avg. 7.2 mm), and shows a slight tendency to shift to the right in 57% of the cases. 23% shift toward the left with the weak maximal value of 5 mm, and 20% do not shift. The average shift to the right is 2.3 mm. The duodenojejunal angle inclines toward the front (74%; avg. 6°) and to the left (94%; avg. 10.6°).

These figures reveal that the duodenojejunal angle is far from being fixed, as has been generally assumed.

GLOBAL ANALYSIS OF THE DUODENUM

If we analyze the dynamic of the duodenum, not just segmentally but as a whole, we find that it descends (85%; avg. 5.5 mm), advances (85%; avg. 6.4 mm), and tends to shift horizontally to the left (75%; avg. 1.4 mm). It tends to incline to the left (82%; avg. 4.1°) and to the front (80%; avg. 5.4°).

The segmental analysis allows us to add that in the frontal plane, it curls up on itself by drawing together its proximal and distal segments. In the sagittal plane, the average shift from back to front is more significant for the first and second duodenum (respectively, 7.5 and 5.1 mm) than for the fourth duodenum (4 mm).

During inhalation, the duodenum seems to make a kind of torsional movement on itself in the sagittal and frontal planes. We would suggest an important role for the third part of the duodenum in this movement. We have described that the third part of the duodenum descends like the other segments, while also showing a tendency in the frontal plane to shift horizontally and incline either to the right or to the left. It shows only a very weak tendency to advance (1.8 mm). The root of the mesentery, which crosses the third part of the duodenum vertically, seems to confer on the third part of the duodenum this relative fixity and this faculty for "adaptation." The third part of the duodenum thus plays the role of a junction point between the proximal and distal segments, which draw together in the frontal and in the sagittal planes.

Jejunum and Ileum (Mesenterial Intestine) (figs. 9.6 and 9.7)

The mesenterial intestine, in its frontal plane, has been studied like the other parts of the gastrointestinal tract, according to its anatomical divisions: the jejunum and the ileum. In the sagittal plane, for obvious reasons, the mesenterial intestine could only be studied globally.

JEJUNUM

(frontal plane: 45 cases)

The jejunum descends (91%; avg. 3 mm) and shifts either to the right (40%) or to the left (38%). 22% of the cases do not shift. The jejunum inclines, or more precisely spreads outward, to the left (82%; avg. 3.6°). It is mainly the superior loops of the jejunum that spread out to the left. According to our findings, the more the jejunum descends, the more it spreads out to the left.

ILEUM

(frontal plane: 33 cases)

The ileum descends in 76% of the cases. In 6%, it ascends, but only with a maximal value of 3 mm, which is at the limit of the margin of error. 18% do not show a shift (avg. 2 mm). The ileum does not show a horizontal shift discernible by our methods either to the left or the right. Its superior loops spread outward to the right in 76% of the cases. In 24%, it goes in the opposite direction, but with a very weak maximal value of 3°; the average is 2.4°. No correlation among these movements is observed.

JEJUNUM AND ILEUM (MESENTERIAL INTESTINE)

(sagittal plane: 36 cases)

In the sagittal plane, the mesenterial intestine descends (86%; avg. 2.3 mm), advances (97%; avg. 2.2 mm), and its superior loops tend to spread out to the front (78%; avg. 6.8°). According to our findings, in the sagittal plane, the more the mesenterial intestine spreads out to the front, the more it advances.

GLOBAL ANALYSIS OF THE JEJUNUM AND ILEUM (MESENTERIAL INTESTINE)

During inhalation, the mesenterial intestine descends and advances; it spreads its jejunal and ileal flexures outward in the frontal plane and forward in the sagittal plane.

We observe that, in the frontal plane, the jejunum and the ileum spread out laterally in opposite directions (the jejunum to the left and the ileum to the right). We will see further on, in the section on the analysis of the colon, that the ascending colon and descending colon each tilt toward the interior and meet the small intestine. This seems to correspond to the role, which has long been attributed to the mesenterial intestine, of being a distributor of pressure.

Colon (figs. 9.6 and 9.7)

CECUM

(frontal plane: 38 cases) (sagittal plane: 27 cases)

The cecum moves in an oblique plane downward and forward. It descends in 79% of the cases (avg. 4.2 mm), ascends in 5% of the cases, and in 16% does not shift. It advances in 81.5% of the cases (avg. 5.4 mm), but does not show a left-right transverse shift discernible by our methods. It tends to incline toward the back (81%; avg. 3.1°) and toward the right (74%; avg. 4.7°). It is one of the four exceptions to the direction of inclination in the sagittal plane for the gastrointestinal system, which generally inclines toward the front (see p. 32). No correlation has been observed between these different parameters.

ASCENDING COLON

(frontal plane: 34 cases) (sagittal plane: 23 cases)

The ascending colon moves in an oblique plane downward and forward. It descends (85%; avg. 3.8 mm), advances (91%; avg. 6.2 mm), and shifts either to the right or to the left. It shows a slight tendency to incline to the left in 59% of the cases. In 17.5%, it goes in the opposite direction; 23.5% do not shift. The average is 3.3°. The ascending colon tends to incline to the front (70%; avg. 6.7°).

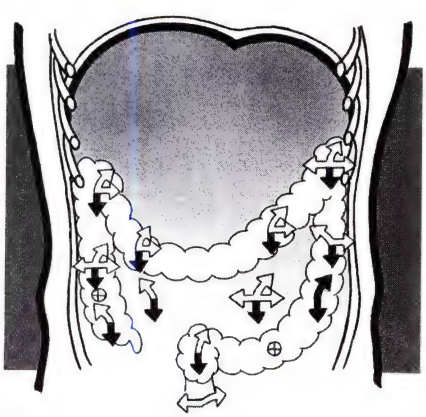


Fig. 9.6. Colon, jejunum, and ileum: frontal plane; the arrows situated outside the colon indicate the dynamic of the jejunum and ileum

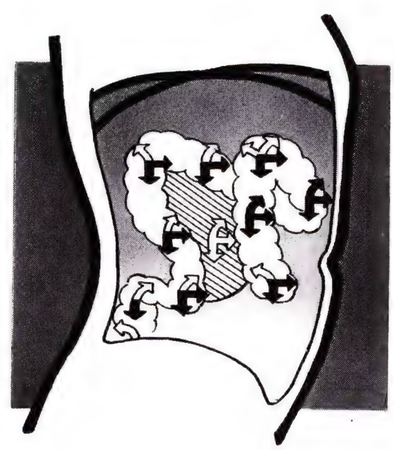


Fig. 9.7. Colon, jejunum, and ileum: sagittal plane; the arrows situated outside the colon indicate the dynamic of the jejunum and ileum

It is to be noted that the dynamic of the ascending colon seems to organize itself around a relatively fixed point, around which it pivots, situated at its union with the cecum. According to our findings, the more the ascending colon descends, the more it advances and inclines to the front.

RIGHT COLIC FLEXURE

(frontal plane: 42 cases) (sagittal plane: 31 cases)

The right colic flexure moves in an oblique plane down, to the front, and to the left. It descends (93%; avg. 11.8 mm), advances (90.5%; avg. 8.6 mm), and tends to shift to the left (74%; avg. 2.9 mm). It tends to incline to the left (71.5%; average 6.2°) and either to the front or to the back. It is one of the four exceptions to the direction of inclination in the sagittal plane for the gastrointestinal system, which generally inclines toward the front (see p. 32). According to our findings, the more the right colic flexure advances, the more it inclines either to the front or to the back.

RIGHT TRANSVERSE COLON

(frontal plane: 37 cases) (sagittal plane: 24 cases)

The right transverse colon moves in an oblique plane down, to the front, and to the left. It descends (89%; avg. 8.9 mm), advances (83%; avg. 8.5 mm), and shows a slight tendency to shift to the left (62%; avg. 1 mm). It tends to incline to the left in 60% of the cases, 38% go in the opposite direction, and 2% do not move. The average is 1.2°. It inclines to the front (88%; avg. 3.3°). According to our findings, the more the right transverse colon descends, the more it advances.

LEFT TRANSVERSE COLON

(frontal plane: 33 cases) (sagittal plane: 23 cases)

The left transverse colon moves in an oblique plane down, to the front, and to the left. It descends (88%; avg. 7.3 mm), advances (100%; avg. 10.5 mm), and shows a slight tendency to shift to the left (64%; avg. 1 mm). It tends to incline to the left in 57.5% of the cases (max. value 33°). In 42.5% of the cases, it goes in the opposite direction, but with a far lower maximal value (9°). The average is 2.1°. It inclines to the

front (65%; avg. 2°). According to our findings, the more the left transverse colon shifts to the left, the more it tends to incline to the left; the more it descends, the more it advances.

LEFT COLIC FLEXURE

(frontal plane: 36 cases) (sagittal plane: 32 cases)

The left colic flexure moves in an oblique plane downward and forward. It descends (92%; avg. 14.3 mm), advances (94%; avg. 16.3 mm), and shifts either to the right or to the left. It tends to incline to the left (72%; avg. 5.6°) and toward the back (75%; avg. 3.4°). It is one of the four exceptions to the direction of inclination in the sagittal plane for the gastrointestinal system, which generally inclines toward the front (see p. 32). No correlation has been observed among these different parameters.

DESCENDING COLON

(frontal plane: 32 cases) (sagittal plane: 20 cases)

The descending colon moves in an oblique plane downward, forward, and to the left. It descends (94%; avg. 7.2 mm), advances (100%; avg. 8.5 mm), and tends to shift to the left (75%; avg. 1.2 mm). It tends to incline to the right (60%; avg. 2.5°) and to the front (85%; avg. 6.7°). According to our findings, the more the descending colon advances, the more it inclines to the front.

Let us bear in mind that the ascending colon and the descending colon tilt toward the interior during inhalation—coming to meet the flexures of the mesenterial intestine (jejunum and ileum), which spread out to the exterior, thereby securing a counterpressure and a distribution of the intra-abdominal pressure.

ILIAC COLON

(frontal plane: 32 cases) (sagittal plane: 20 cases)

The iliac colon (the part of the colon lying between the iliac crest and the pelvic inlet) moves in an oblique plane downward and forward. It descends (81%; avg. 2.5 mm) and tends to advance (70%; avg. 2.7 mm), but does not present a transverse shift detectable by our methods. It inclines to the left in 84% of the cases (avg. 2°). It inclines to the

front in 55% of the cases; 25% of the cases go in the opposite direction but with lesser values; 20% do not show a shift. The average is 1.7°.

The dynamic of the iliac colon seems to organize itself around a pivot point situated at its union with the first portion of the sigmoid. In so doing, it shows a similarity of functioning to the ascending colon, which pivots around a relatively fixed point at its union with the cecum.

SIGMOID COLON

(frontal plane: 25 cases) (sagittal plane: 21 cases)

We have been very cautious in the interpretation of the results obtained in the study of this visceral segment because the shifts are, in their entirety, extremely weak and at the limit of the margin of error determined at the beginning of this study. The sigmoid colon seems to descend (avg. 1.3 mm) and tends to incline to the left (avg. 1.6°) and to the front (avg. 0.9°). According to our findings, the more the sigmoid colon descends, the more it inclines to the left.

RECTUM

(frontal plane: 25 cases) (sagittal plane: 17 cases)

The very small movements in the dynamic of this visceral segment also lead us to be cautious in our interpretation. It seems that the rectum shifts in an oblique plane down and to the right and inclines to the left and to the back.

GLOBAL ANALYSIS OF THE COLON

As has been previously described by other authors, the colon seems to make a global movement of rotation clockwise. This is supported by our observations, in that there exists a greater descent of the left colic flexure (avg. 14.3 mm) and of the descending colon (avg. 7.2 mm) than of the right colic flexure (avg. 11.8 mm) and ascending colon (avg. 3.8 mm). Most of the axes incline from the right to the left.

In short, we can say that during inhalation, the colon descends, advances, and tends to incline to the front. Moreover, in the frontal plane, it seems to make a global clockwise rotation movement, while at the same time its ascending and descending segments are drawing closer together.

chapter **10**

Dynamics of the Liver, Kidneys, Pancreas, and Spleen

Echographic examinations were used to determine the dynamics of the liver, spleen, kidneys, and pancreas. All previous descriptions of the statistical analyses and the general tests for error (chaps. 8 and 9) are of value in considering the echographic study of the dynamics of these organs, except for the specific considerations concerning the X-ray examinations. The observations that follow are those that are particularly related to the echographic technique and to the methodology that proceeds from it.

POTENTIAL SOURCES OF ERROR

In addition to the difficulty involved in the interpretation of the studies, the echographic examination itself can be a source of incorrect images and other artifacts; also, the many manipulations required to convey the image to the computer increase the risk of error. Because we are conscious of these possible sources of error, we thought it important to recognize and classify them. As a result of this process, we carried out tests for error that were submitted to statistical analysis. We then used these results to set up the protocol for examination, and we took all precautions in order to eliminate the identified sources of error.

We consulted an engineer at the Toshiba company about the elementary physics of ultrasound machines, in order to have the certainty that the echographic technique does indeed permit a study of the dynamics as we envisaged it. *(Note: We thank Mr. Leo Welkenhuysen, biomedical engineer of the Toshiba Company, Antwerp, Belgium, who kindly gave us his opinion on the limits of the imagery in echography. His remarks principally concerned the power of resolution, which is the precision of the echographic information brought back*

to the image.) Features of the ultrasound machine pertaining to resolution include:

Axial resolution: In the axis of the beam, two objects cannot be identified separately unless they are separated by a minimal distance, given by the formula: $c = \lambda f$ (where c is the speed of light, λ is the wavelength in millimeters, and f is the probe frequency). In our case, with the probes ranging from 3.5 to 3.75 mHz, the resolution is ±0.41 mm, which did not in any instance affect the study.

Lateral resolution: This is the widening of the ray that occurs as it becomes distant from the crystal, which leads to a widening of the image and consequently a poor resolution. This poor resolution is precisely what occurred in the case of the "sectorial" echographs, and we were forced to dispose of them.

Transverse resolution: This is the thickness of the "slice" of the section made by the ultrasound. This did not give rise to any problems.

Conclusion: The poor lateral resolution in "sectorial scanning" was the main stumbling block. This was chiefly a factor when looking at the mobility in the vertebral planes because these are situated in the most distant field from the probe, where the resolution is the poorest. With regard to the images closest to the probe in the overlapping zone, when a disturbance in the figures did occur, there was no modification in the direction of the dynamics.

Classification of the Potential Sources of Error

ECHOGRAPHIC PROTOCOL

Potential errors in preparation: Regarding the position of the patient, all patients were positioned in an identical way and the examination was standardized. We observed that the tests in deep inhalation and exhalation and in a lying-down position did not notably modify the direction of the dynamics. The settings of the apparatus remained constant, both as regards the angle opening and the size of the image; all other technical parameters were constant. During the course of our study, the radiology department acquired a new Toshiba echograph, which we used to carry out most of the examinations. Compared with the examinations carried out on the older apparatus, no modification in the studied visceral dynamics appeared.

Potential errors in operation: We were mindful of two issues in particular—one, the immobility of the patient during the examination; the other, the amplitude of the respiratory movement. For a discussion of the issue of patient movement, see the section on "Research of Error" that follows. Regarding the amplitude of respiration, variations did exist. However, during the error testing, the image was obtained on ten consecutive respirations without any modification in the direction of the dynamic.

It was difficult to keep the same section of the studied organ in view during the two respiratory stages. Because of this, we paid particular attention to strictly respecting the section planes through the use of constant contacts and references. We ensured the strict horizontality of the probe by using a device that consisted of an air level affixed on the upper surface of the probe (fig. 10.1). Here again we carried out ten repetitions of similar images to show that the examination conditions were constant. The visual analysis of the obtained images showed that the section planes could be identical during the two respiratory stages if the conditions mentioned above were respected; whenever this was not the case, it is pointed out in the interpretation. Tests done for the effects of voluntary shifts of the probe showed that, under these conditions, the sections were clearly different. The coefficients of correlation enabled us to establish a correlation between the different sections, thus giving a greater value to the interpretation.

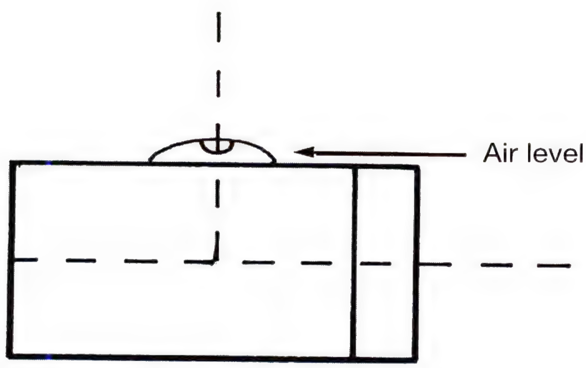


Fig. 10.1. Air level on probe

READING PROTOCOL

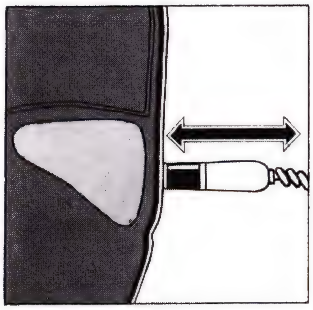
Potential errors of interpretation: The reading of the echographic images was done by us. We have been guided throughout the study by Taboury's *Guide pratique d'échographie abdominale* and by the instruction of radiologist Dr. Phillipe Dehaene. In order to prepare us for this difficult project, Dr. Dehaene very kindly allowed us to observe him for several months during the examinations he performed in his practice.

Potential transcription errors: There were three transcription phases: (1) numbering, sectioning, and classification; (2) enlargement and reproduction of the pictures; and (3) reproduction on the graph. These phases are discussed in detail in chapter 8.

Research of Error

With the aim of objectively examining the various means of inadvertently creating false images so they could then be recognized or avoided, we purposely shifted the probe in different ways in order to estimate the effects. We found that shifting the probe also shifts the section angle, which then gives a totally fictive impression of movement that can thus constitute a source of error. The tests we carried out were performed on the left, "middle," and right lobes of the liver in sagittal section, with the patient holding the breath. *(Note: "Middle lobe" is an unofficial term used to describe the "middle" paravesical part of the liver, the gallbladder being the landmark for this area.)*

FORWARD AND BACKWARD PRESSURE OF THE PROBE (FIG. 10.2)



First image: forward pressure
Second image: relaxing

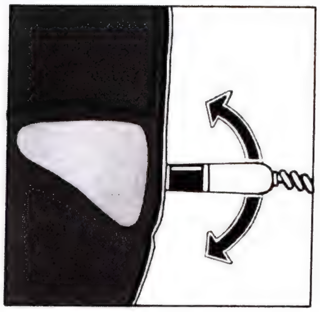
Fig. 10.2. Testing for forward and backward pressure of the probe

Liver, left lobe, sagittal plane. Interpretation: In attempting to provoke a false vertical shift, we could only produce one with a small amplitude. However, it was possible to induce a relatively large fictive anteroposterior shift as well as a variation of the inclination angle.

Liver, "middle" lobe, sagittal section. Interpretation: It was possible to produce a small vertical and anteroposterior shift. We were able to produce a significant fictive shift in the angle of inclination.

Liver, right lobe, sagittal section. Interpretation: It was possible to produce a fictive vertical and anteroposterior shift. The fictive shift in the angle of inclination can be large.

We observed in the statistical analysis that we could only provoke a slight shift in the *vertical parameter*, which was far less than the averages and therefore did not in any case influence the interpretation and does not constitute a source of error. We could provoke a rather large shift in the *anteroposterior parameter*. This occurred in relation to the voluntary shift of the probe precisely in the anteroposterior direction used for this test. This, however, required a voluntary and large shift of the probe, which in no instance was reproduced during the examinations and which, under normal circumstances, can only be a casual source of error diluted in the statistics. We could provoke a very large variation in the *angle of inclination,* but only with obviously exaggerated figures, which we again did not find during the examinations. Therefore, as with the anteroposterior shift, under normal circumstances, this shift is not a significant source of error.



(patient with breath held)
First image: shift upward
Second image: shift downward

Fig. 10.3. Testing for changes in inclination of the probe

INCLINATION OF THE PROBE UPWARD AND DOWNWARD (FIG. 10.3)

We were able to provoke fictive shifts in the vertical and anteroposterior directions and in the angle of inclination. It was observed, however, that the figures obtained from these fictive shifts were quite obviously exaggerated and never appeared as such during the examinations. Nevertheless, in order to circumvent this risk of error, we fixed an air level on the upper part of the probe, and we took care during examinations to maintain the strict horizontality of the probe, thus avoiding all possibility of inclination.

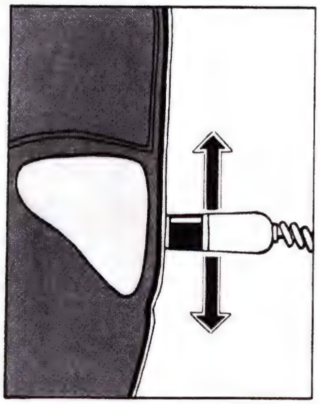


Fig. 10.4. Testing for upward and downward gliding of the probe

UPWARD AND DOWNWARD GLIDING OF THE PROBE (FIG. 10.4)

The same observation applies to the upward and downward gliding of the probe. We were able to provoke fictive shifts, but controlling the horizontality of the probe by means of the level prevented any false image. In any case, if there were an inadvertant upward or downward shift, we would probably lose the organ's image or it would be so modified that it would show a clear discontinuity or obviously exaggerated shift.

POTENTIAL ERROR IN THE DYNAMIC OF THE KIDNEY

This research error is of some interest because in certain cases (due to anatomical particularities), we had to incline the probe purposely in order to maintain the organ in the echographic frame. We saw that when we purposely inclined the probe during inhalation and exhalation, the vertical and anteroposterior shifts of the kidney underwent only small variations as compared to the averages. However, we were able to provoke a variation of the direction of rotation of the organ, although it was of feeble amplitude. But it does call for a slight reservation as to the judgment we give about the variation in the angle of inclination. Fortunately, we were able to set aside the possibility of inadvertently inclining the probe, thanks to the affixing of an air level.

SHIFT OF THE PATIENT IN SPACE

Although improbable, it is possible that a slight shift of the patient in space could have happened and that this could diminish the reliability of the examination. Therefore, we asked the patient to deliberately flex and extend to a small degree. Taking into account the previous tests and the precautions taken, the test revealed itself to be negative. Any small shift of the patient in space, if it had existed, would in no way have falsified the interpretation of the examinations.

ANALYSIS OF THE REPETITIVE CHARACTER OF THE DYNAMICS

In order to determine if the dynamics of the organs shown in one single inhalation and exhalation were repetitive, it was important to research the existence of this phenomenon. Such a test also allowed us to confirm the reliability of the method, given that it is about a "systematic" and given that certain sources of error, already put into evidence, risked interfering with the test.

Thus, we asked for ten repetitions of the inhalation and exhalation while maintaining the ultrasound probe at a fixed point and ensuring the stable conditions of the examination. We chose arbitrarily a section for each organ, namely: liver, left lobe, sagittal section; right kidney, sagittal section; spleen, sagittal section; and pancreas, sagittal section.

This test showed that the repetitive character is absolute and, in consequence, allows us to affirm the reliability of the method as to the estimation of systematic dynamics and that the interference from the possible sources of error is limited to the restrictions previously expressed.

METHODOLOGY

The examinations were carried out by echography. The *equipment* used included a Sonel Echograph 202 C GR, period 80, sectorial with a 90° angle; probe 3.5 mHz, maximal penetration of the beam is 17 cm. We also used a Toshiba echograph Sonoloayer Ussa, 90 A, real sectorial time; probe 3.75 mHz, maximal penetration of the beam is 15 cm, scale 1. The machines were set for automatic scanning in D mode (used for the exploration of mobile structures).

The *people* examined were volunteers and free of established visceral pathologies. The age range was 20 to 45 years. The height range was 1.54 to 1.93 meters. The weight range was from 52 to 100 kg. 75% of the subjects were male.

The *examinations* were carried out in a standing position, which gave the advantage of reproducing the dynamic conditions of the organ in everyday life. To represent these common conditions, a normal inhalation and exhalation were requested, which prevented the rib cage from being expanded too greatly and prevented abdominal bulging, thus guaranteeing good examination conditions.

The *reference contacts* of the probe were constant and were only appreciably modified in order to satisfy particular anatomical situations. With the equipment used, the scanning was automatic. The probe was held strictly at a fixed point in such a way that the examined organ was visible in the whole or in equal part, in the echographic frame in both inhalation and exhalation, which allowed us to estimate its dynamics. Moreover, the number of dots composing the circumference and the surface of the drawn organ, when transferred to the computer, allowed us to ensure that we studied the same sections in inhalation and exhalation.

Approach to the Organs

EXAMINATION TECHNIQUE

(Note: The examination technique used was taken from Guide pratique d'échographie abdominale *by Taboury.)*

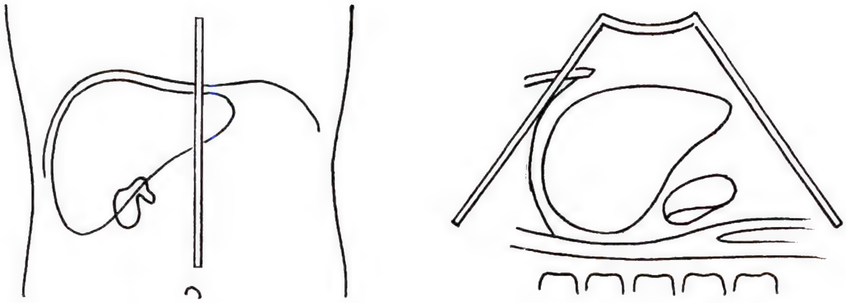
For reasons particular to our study, we had to make certain modifications from standard abdominal ultrasound technique. The usual preoccupation of the radiologist is to diagnose the structural pathology using the most favorable angle, which can be modified as needed. In contrast, it was imperative for us to maintain the organ in the echographic image during the two respiratory stages, in order to maintain, if possible, the same section and, of course, the same fixed point.

The echographic examination permits one to see only a fragmentary portion of the liver and the spleen, which extend beyond the angle of the image. As a result, when necessary, we will specify the part of the organ which was studied.

LIVER

Sagittal sections (three sections; fig. 10.5–7): left lobe; "middle" lobe; right lobe (with right kidney). The examination of the sagittal sections allowed for the observation of the dynamics in the sagittal plane. The reference contacts were anterior: (1) in the sub-xiphoid region for the left lobe; (2) at the end of the intercostal space between the seventh and eighth ribs for the "middle" lobe; and (3) at the end of the intercostal space between the tenth and eleventh ribs for the right lobe. With this positioning we were able to observe the edge of the diaphragmatic arch and the posterior and inferior edge of the liver.

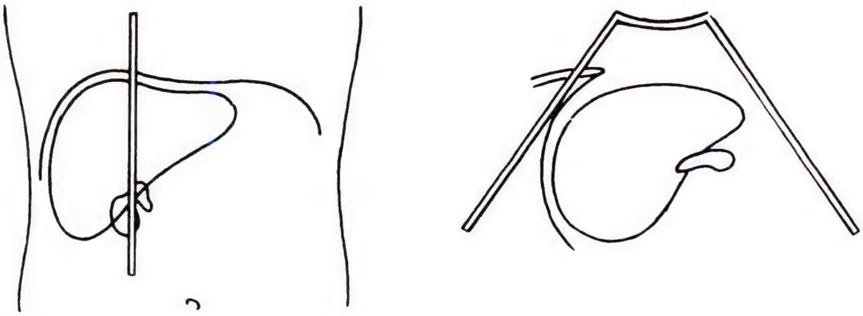
Intercostal frontal section (one section; fig. 10.8): This examination allowed for the observation of the dynamics in a frontal plane. The reference contact was lateral on the rib cage, in the space between the eighth and the ninth ribs, on the anterior axillary line, in a direction that was the most parallel to the posterior plane of the subject and perpendicular to the sagittal plane. We noted that the slight variations in the position did not modify the dynamics taken as a whole. We were able to observe the diaphragmatic arch and the internal part of the inferior face of the liver.



Section plane

Echo image

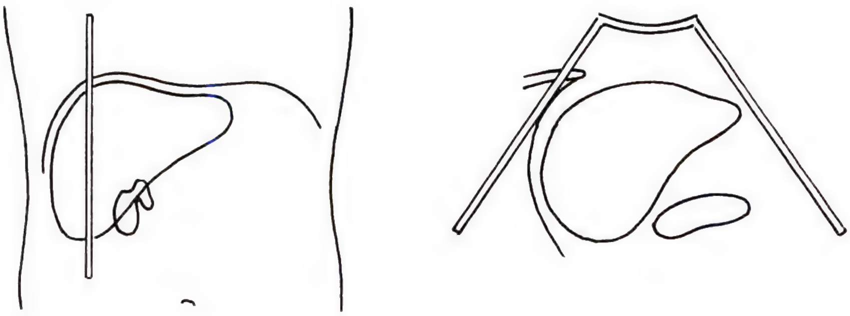
Fig. 10.5. Liver, left lobe: sagittal section



Section plane

Echo image

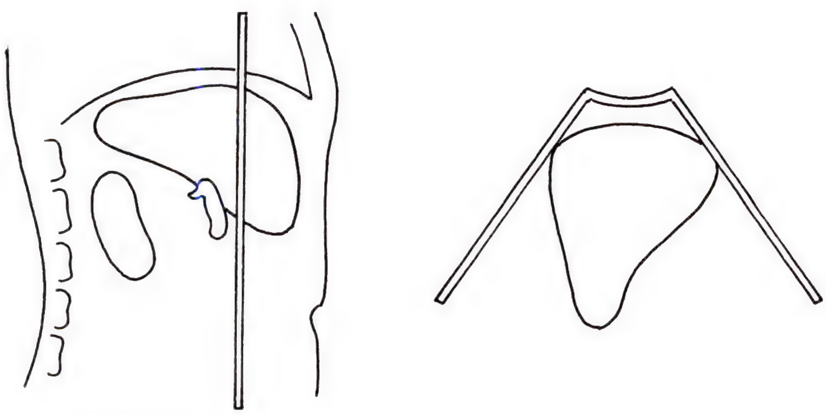
Fig. 10.6. Liver, “middle” lobe: sagittal section



Section plane

Echo image

Fig. 10.7. Liver, right lobe: sagittal section



Section plane

Echo image

Fig. 10.8. Liver: frontal section

Horizontal section (one section; fig. 10.9): This examination allowed for the observation of the dynamics on a horizontal plane. The reference contact was anterior, at the end of the intercostal space between the seventh and eighth ribs. We were able to observe an internal line that represents the posterior and inferior faces of the liver. *(Note: Here we had at our disposal an anatomical landmark, the vertebra, against which we could estimate the real shift of the organ.)*

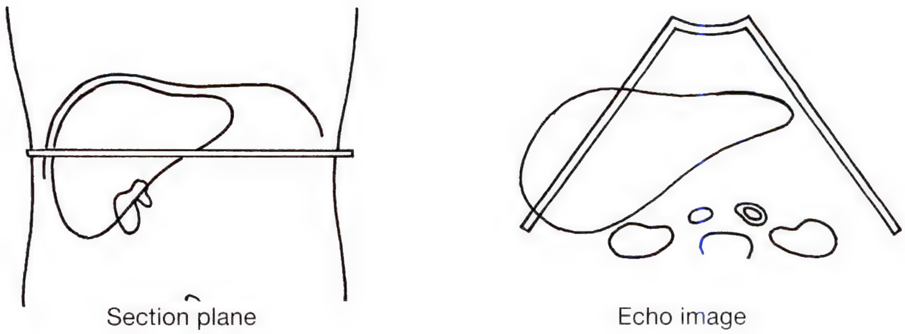


Fig. 10.9. Liver: horizontal section

KIDNEYS

Sagittal section (one section; fig. 10.10): This examination allowed for the observation of the dynamics of the kidney in a sagittal plane. The reference contact was posterior, more or less in the angle made by the mass of the sacrospinal muscle and the twelfth rib, at the level of the spinous process of L2. We could see the organ in its entirety.

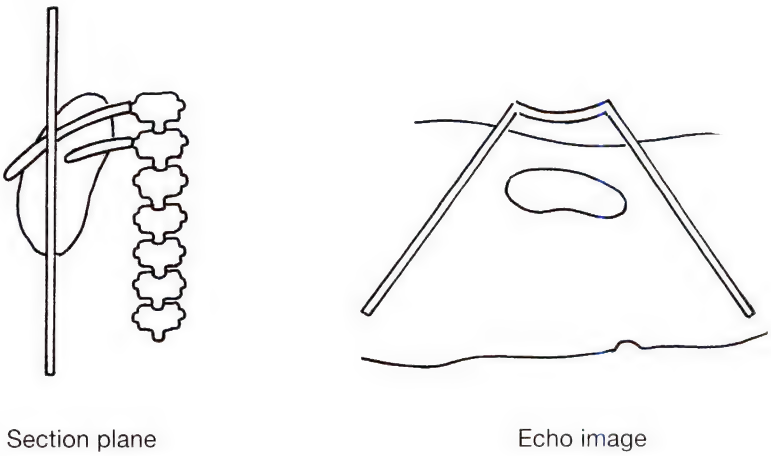


Fig. 10.10. Left kidney: sagittal section

Frontal intercostal section (one section; fig. 10.11): This examination allowed for the observation of the dynamics of the kidney in a frontal plane. The reference contact was on the rib cage, in the intercostal space between the ninth and tenth ribs, on the posterior axillary line, in the posterior plane of the subject and perpendicular to the sagittal plane. We could see the organ in its entirety.

Horizontal section: The examination for the horizontal section was not reliable and did not allow any interpretation.

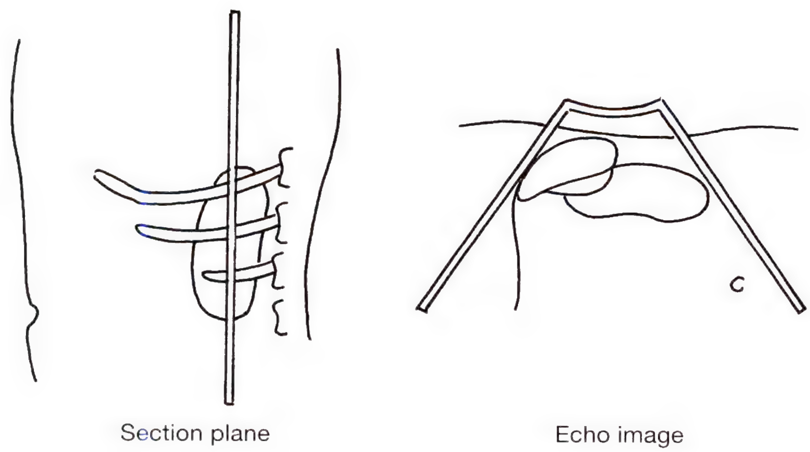


Fig. 10.11. Left kidney: frontal section

PANCREAS

Para-aortic sagittal section (one section; fig. 10.12): This examination allowed for the observation of the dynamics of the pancreas at about the level of the isthmus in a sagittal plane. The reference contact was midway between the xiphoid process and the umbilicus, slightly

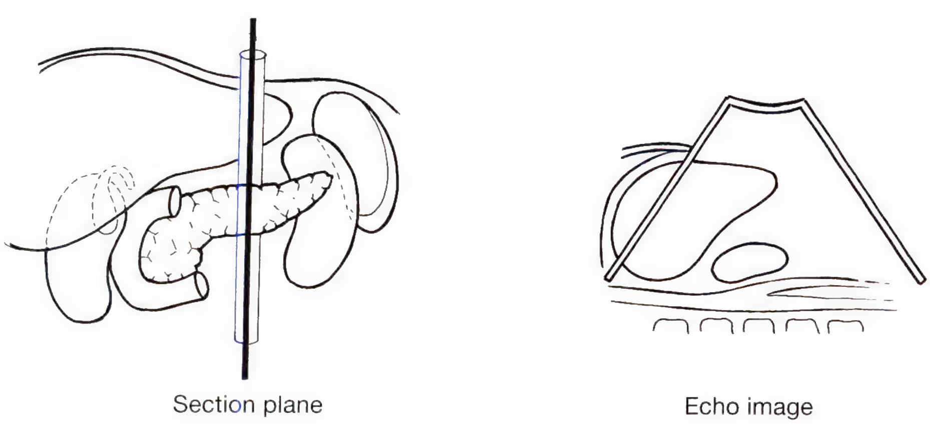
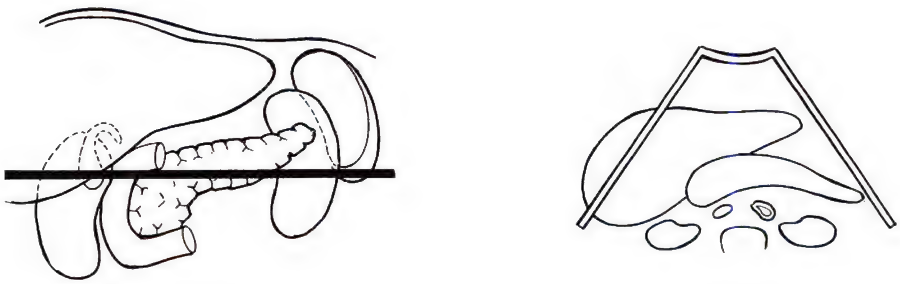


Fig. 10.12. Pancreas: sagittal section

to the right of the midline. *(Note: The approach to the pancreas was relatively difficult with this kind of examination because it was not easy to hold onto the image of the organ during the two respiratory stages. We therefore had to settle for only one lengthwise section because this was the only section that conformed to the requirement that the organ remain visible during both respiratory stages. We took this into account in the interpretation of the results.)*

Horizontal section (one section; fig. 10.13): This examination allowed for the observation of the dynamics of the pancreas in a horizontal plane. The reference contact was midway between the xiphoid process and the umbilicus on the midline. We observed either the whole or a part of the organ, depending on the circumstances, with the tail of the pancreas escaping during the respiratory movement. *(Note: Here we had available the vertebral anatomical reference mark, against which we could estimate the real shift of the organ.)*

Frontal section: The frontal section could not be examined by echography.



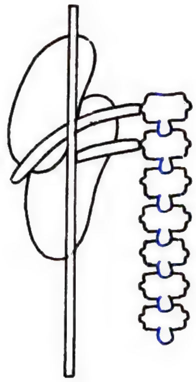
Section plane

Echo image

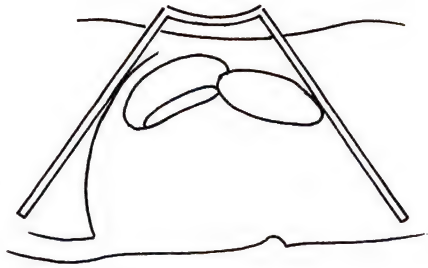
Fig. 10.13. Pancreas: horizontal section

SPLEEN

Sagittal section (one section; fig. 10.14): This examination allowed for the observation of the dynamics of the spleen in a sagittal plane. The reference contact was posterior, on the rib cage, in the intercostal space between the tenth and eleventh ribs, at a three-finger-width distance to the left of the spine. We observed the inferior part of the anteromedial face of the organ, with the superior pole escaping during the respiratory movement.



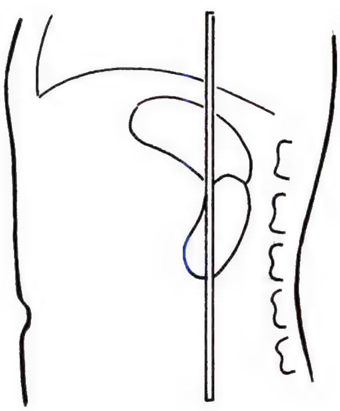
Section plane



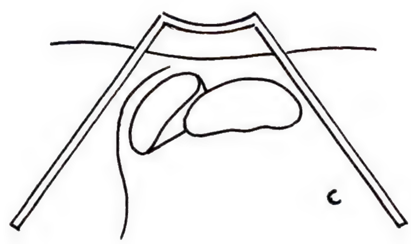
Echo image

Fig. 10.14. Spleen: sagittal section

Frontal intercostal section (one section; fig. 10.15): This examination allowed for the observation of the dynamics of the spleen in the frontal plane. The reference contact was posterior, in the intercostal space between the ninth and tenth ribs, on the posterior axillary line. We observed the inferior part of the anteromedial face of the organ, with the superior pole escaping during the respiratory movement.



Section plane



Echo image

Fig. 10.15. Spleen: frontal section

Conclusion

We have attempted to minimize all possible inaccuracies in the experimental process. We submitted the process to testing and statistical analysis, which demonstrated the reliability and/or the limits of the method. We also have tried to identify and eliminate the many flaws

that could occur in the process—from the examination to the presentation of the pictures to the data processing for the statistics and the biometric interpretation.

Therefore, we believe the estimations put forth in this study are valid, given the reservations we have outlined in the technical limits of the echographic examination, the potential sources of error, and the difficulties, in certain cases, in the interpretation of the statistical analysis.

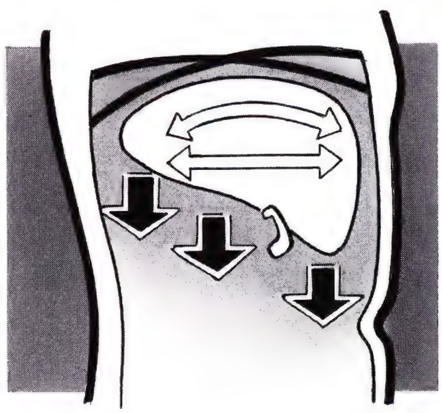
BIOMETRIC ANALYSIS OF THE DYNAMICS OF THE LIVER, KIDNEYS, PANCREAS, AND SPLEEN

Liver

Sagittal section (30 cases; fig. 10.16): We have analyzed the dynamics of the liver at the levels of the left, "middle," and right lobes. *(Note: "Middle lobe" is an unofficial term used to describe the "middle" paravesical part of the liver, the gallbladder being the landmark for this area.)* From this observation, it appears that the entire liver, under the diaphragmatic pressure, makes a shift in sagittal section from above to below in a systematic way. Although we observe anteroposterior shifts as well as some inclination, it is not possible to define a clear pattern of movement.

Frontal section (30 cases; fig. 10.17): Under diaphragmatic pressure, the liver appears to shift in a frontal section from above to below in a systematic way (avg. 23.1 mm). In looking at other movements, we observe weak transverse shifts and inclinations, from which it is not possible to define a clear pattern of movement.

Fig. 10.16. Liver: sagittal section



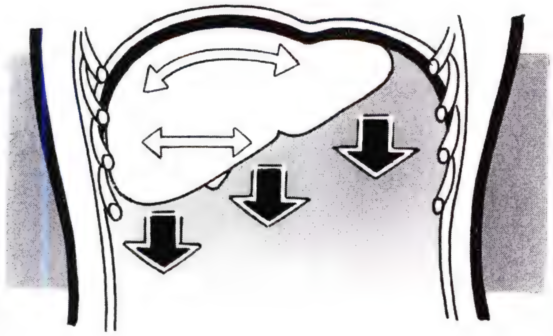


Fig. 10.17. Liver: frontal section

Horizontal section (29 cases): Here we come up against the limits of the echographic imagery. In order to define the liver dynamics in the horizontal section, another type of imagery is required.

From the study of the dynamics of the liver in a horizontal plane and using a comparison with the vertebra included in the same plane, it is not very probable that the liver shifts laterally to medially. In fact, if there is any tendency, it is that the translation of the vertebra is similar to the translation of the liver. This global movement can be provoked by a slight transfer of the probe during inhalation, the control level fixed on the probe being of no use here.

We also have to stress the fact that it is not possible, in the horizontal section, to keep the same section of the liver in view during inhalation and exhalation, probably because it is making a simultaneous movement from above to below, which is proved by the fact that the gallbladder disappeared from the screen. For reasons given in the section, "Potential Sources of Error," earlier in this chapter, we also must use some caution in coming to a conclusion regarding a possible anteroposterior shift or a shift in rotation.

Kidneys

Sagittal section (30 cases; fig. 10.18): Under diaphragmatic pressure, the kidneys appear to make a shift in a systematic way in the sagittal section from above to below (avg. right 18.9 mm, left 12.9 mm) and from back to front (avg. right 8.85 mm, left 8.55 mm). In addition, in about 70% of the cases, there is a tendency to posterior inclination (avg. right 4.1°, left 6.4°), which is particularly evident at the end of the movement during inhalation.

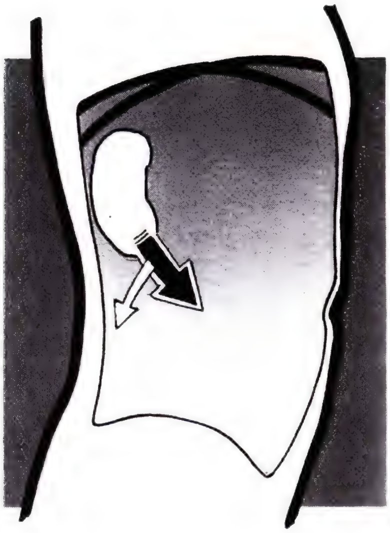


Fig. 10.18. Right kidney: sagittal section

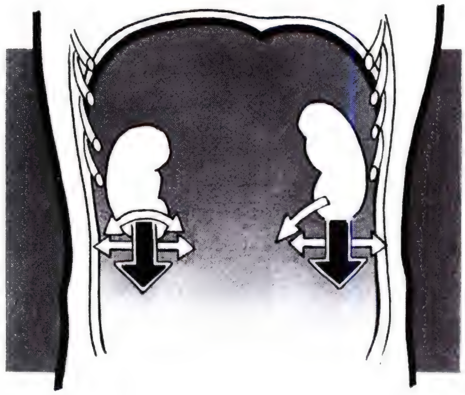


Fig. 10.19. Kidneys: frontal section

Frontal section (left kidney 26 cases; right kidney 30 cases; fig. 10.19): Under diaphragmatic pressure, the kidneys appear to make a systematic shift in the frontal section from above to below (avg. right 16.05 mm, left 16.85 mm). In regard to other movements, as far as the right kidney is concerned, even though we can observe slight transverse shifts and a slight inclination, it is not possible to deduce a clear pattern of movement. The left kidney, however, in 69% of the cases shows a very slight tendency during inhalation to incline to the right (avg. 1.2°), although we have observed some right and left oscillations.

Fig. 10.20. Pancreas: sagittal section

Pancreas

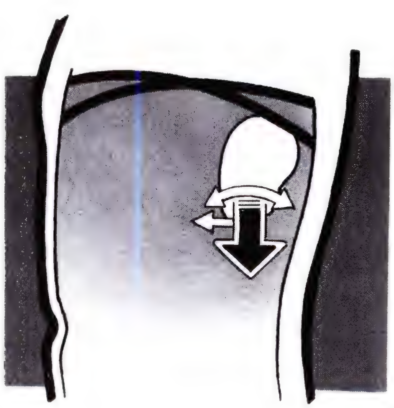
Sagittal section (30 cases; fig. 10.20): Under diaphragmatic pressure, the pancreas appears to make, in the sagittal section and at the level of the isthmus, a shift from above to below in a systematic way (avg. 12.75 mm). Additionally, in 97% of the cases, it shows a clear tendency to shift during inhalation from front to back and in 90% of the cases shows a posterior inclination. However, we have to express some reservations along with these findings due to the technical limits of the echographic imagery.

Horizontal section (25 cases): We find at this level a consistent shift in the anteroposterior direction. As was described in the preceding paragraph for the movements in the sagittal section, the pancreas seems to shift during inhalation from front to back (100% of the cases; avg. 10.8 mm). But, we probably were not able to keep the same section on the screen because of the shift shown from above to below. So, as was the case with the horizontal section of the liver, we can only presume that this is fact. It needs to be confirmed with the help of another imaging approach.

Spleen

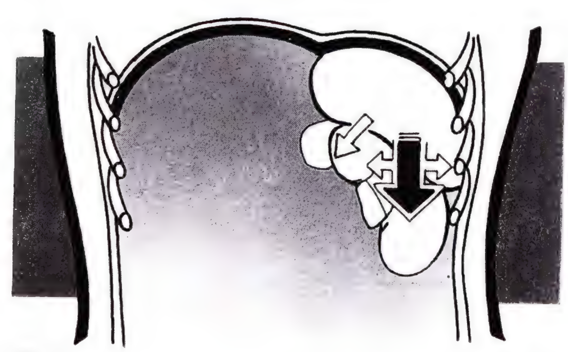
Sagittal section (29 cases; fig. 10.21): Under diaphragmatic pressure, the spleen appears to make a shift in the sagittal section from above to below in a systematic way (avg. 16.95 mm). We also note, in 70% of the cases, a tendency of the spleen to shift from back to front (3.9 mm). It is not possible to deduce any tendency for inclination.

Frontal section (30 cases; fig. 10.22): Under diaphragmatic pressure, the spleen appears to make a shift in the frontal section in a systematic way from above to below (avg. 20.4 mm). We also observe, in 80% of the cases, a clear tendency to incline to the right (avg. 5.3°); it is not possible to define a tendency for a transverse shift.



Front Back

Fig. 10.21. Spleen: sagittal section



Right Left

Fig. 10.22. Spleen: frontal section

Afterword to the French Edition—1992

Consider what the value to current radiology practice would be of developing a program to make a systematic examination of the visceral dynamics. Radiologists have discussed with us the questions raised in their minds when diagnostic studies are negative in the face of symptoms of visceral disturbance, and because of this they have shown interest in our procedure. However, for our procedure to be useful as a diagnostic study, it would be necessary to develop a computer system able to calculate the visceral shifts from a radiological examination, because otherwise the daily application of our method is not practical. The methods we used in our study are long and tedious and thus incompatible with clinical practice. The most complex technical problem we face in making it a practical exam is how to define the organ outline to be captured by the computer.

The biometric study of an organ could provide evidence of a genuine physical disturbance in those cases which medicine often classifies as psychosomatic because the standard diagnostic studies are negative. Clinical study does suggest that such disturbances can evolve in the years following the onset of the disturbance, from the functional to the frankly lesioned. Biometric analysis allows one to suspect the presence of a lesion at a very early stage, even before its radiological or echographical manifestations. If a statistical analysis of the visceral dynamics were carried out on this population, the link between the functional disturbance and the later appearance of the lesion could be established. At the present time, we are studying the evolution of a group of patients free from clinically manifest lesions but with evidence of visceral dynamic disturbances. We are doing this based on outpatient files established in 1985.

Visceral osteopathy is an expanding field, and the studies done so far have helped it progress. But a lot of work remains to be done. This is an opportunity for those osteopaths wishing to give our profession further scientific validation and understanding. It is our great wish that our colleagues will carry on the work suggested by our initial study.

There is, of course, a distinction between the rigorous, scientific, analytical part of our study and the clinical application of it, which is based on the analysis of the results and on the known embryology, physiology, anatomy, and pathology. We believe that, with the scientific data we collected, we can say that the osteopathic hypothesis of organized diaphragmatic-visceral dynamics now meets the definition of a law. That is, a necessary and constant relation between the phenomena was demonstrated through the analysis of a great number of repetitions of the phenomena. On the other hand, we realize that the application of this data, which led us to the elaboration of a palpatory method, the development of a normalization program, and the conducting of the hemodynamic tests, is still an interpretation which could be considered as being within the realm of a hypothesis.

But is not science a perpetual coming and going between facts and ideas? Should we forbid ourselves from formulating hypotheses, "being afraid of admitting to being a poet out of fear of being excluded from our equals," as A. Tomatis has said in *La nuit uterine*. Such a frame of mind leads to a detrimental inertia. Tomatis goes on to say, "A research worker without poetry is the living image of a sterile pseudo-scientist, who, nevertheless, does make a contribution by confirming through measures and statistics, that which the poet perceived."

When checking hypotheses experimentally, it is good to recall the advice of Claude Bernard in his 1865 text, *Introduction a la medicine experimentale:* "We should only believe in our observations, in our theories, if we have the benefit of an experimental evaluation. If one believes in them too much, the mind...no longer has a freedom of action and lacks, as a result, the initiative that is possessed by he who knows to disengage himself from this blind faith in theories, which are, at their root, nothing more than scientific superstition..."

After all, medicine is not an exact science, and Bichat and Magendie give us food for thought about those who pretend that "physical properties are fixed and constant and the laws of science addressing them are constant as well, and one can predict them and calculate them with certainty. The vital functions being susceptible to so many variables, one cannot predict or calculate anything in their phenomena." Without going quite that far, should we not

adopt a somewhat agnostic attitude, which would say that the absolute is inaccessible to the human mind?

Let us end with Claude Bernard: "We must believe in science, that is to say in the determinism, in the absolute and necessary relation of things...but, at the same time, be fully convinced that we can only have this relation in a very approximate way and that the theories we possess are far from representing unchangeable truths...."

Afterword: Summary of Further Research—2000

Clinical Correlations with Disturbed Visceral Dynamics

Since the initial publication of our book, we have conducted another statistical study based on the radiological data we had collected. The goal of the study, which looked at the diaphragm and gastrointestinal tract, was to determine whether there exists a correspondence between a given visceral symptomatology and a modification of the dynamics at a given level.

We took the entire population studied at the time of our original research and identified a group of patients who presented with a specific complaint (gastralgia, pyrosis, etcetera). We compared, in a statistical manner, the differences between the visceral dynamics of the symptomatic group and the remainder of the patients without symptoms. One example of the difference we observed between the two groups had to do with the dynamics of duodenum. In our original biometric study we had observed that in the inhalation phase the duodenum tends to close its loop. We found that in the patients with gastralgia this duodenal movement is limited.

So, in this subsequent study we were able to demonstrate that a modification of the dynamics of a given organ can correlate with the appearance of a given complaint. Furthermore, we observed that this disturbance in the dynamics can already be present beforethere is a positive radiologic examination, which may develop sometime later.

Our statistical evidence does not stop with a correlation between disturbed dynamics and symptomatology. We have been able to demonstrate a correlation between a modification in the dynamics and a pathological condition. Going back to the example of the duodenum, we were able to show that when an ulcer had been diagnosed we saw a reversal in the duodenal dynamics. Instead of the duodenal loop closing during inhalation, it opened up.

Visceral Mechanical Chains

Other research we are doing includes an analysis of the correlations that exist in each plane (frontal and sagittal) between all the parameters for each diaphragmatic cupola and for each portion of the gastrointestinal tract. For example, we looked at each segment of the tract to see which parameters varied at the same time as the descending movement of the left cupola of the diaphragm. In this way we hope to present supporting evidence for the existence of "visceral mechanical chains" and also to pose the hypothesis that a given level, when disturbed in its dynamics, has the potential to give rise in the future to some disturbance in the dynamics at another level.

The Hemodynamic Test

We have used color Doppler echography to objectively measure pulse modifications in response to abdominal pressure in a population of 30 patients. We used a pressure sensor to ensure that the hand pressure exerted was the same on each zone of the abdomen. The arterial pressure was also recorded in these patients. Currently, we are awaiting a special program to recover and analyze the graphic Doppler results. Our initial analyses seem to confirm the validity of the hemodynamic test.

Imaging Techniques

The imaging techniques we used for our initial studies, X-ray and ultrasound, generally remain the best that are available for this use. However, the newer magnetic resonance imaging technologies and the spiral CT scanner probably can be of some value in our continuing research. For example, they may be able to provide more information about the dynamics of the pancreas, the study of which was limited using echography.

Conclusion

We believe these scientific studies are necessary to confirm our impressions and interpretations of our palpatory and treatment methods. We hope that our research program, when complete, will give visceral osteopathic medicine some of the fundamental scientific understanding that every field of medicine needs today.

Selected Bibliography

Barral, J.P., and P. Mercier. *Manipulations viscérales.* Paris: Maloine, vol. 1, 1983, vol. 2, 1987.

Bonnet, M., and Y. Millet. *Manuel de physiologie*. Paris: Masson, 1967.

Burton, Alan C. *Physiologie et biophysique de la circulation.* Paris: Masson et Cie, 1975.

Busquet, L. *L' ostéopathie crânienne.* Paris: Maloine, 1985.

Drœsbeke, F. *Eléments de statistiques.* 2nd ed. Brussels: Presses Universitaires de Bruxelles, 1981–1982.

Finet, G., C. Williame, and M. Beauport. *Etude biométrique de la dynamique phréno-médiastino-viscérale.* Master's thesis, La Maison des Ostéopathes Namur, Belgium, 1988.

Gabarel, B., and M. Roques. *Les fasciœ en médicine ostéopathique*, vol. 1. Paris: Malonie, 1985.

Gremy, F., and D. Salmon. *Bases statistiques pour la recherche médicale et biologique.* Paris: Dunod, 1969.

Guyton, A. C. *Physiologie de l' homme*, Montreal: HRW, 1974.

Minaire, Y., and R. Lambert. *Physiologie humaine, La digestion*. Villeurbanne, France: Simep, 1976.

Piaget, J. *Epistémologie des sciences de l' homme*. Paris: Gallimard, 1970.

Perlemuter, L., and J. Waligora. *Cahiers d' anatomie, 2: Abdomen I; 3; Abdomen II*. Paris: Masson et Cie, 1975.

Rouvière, H. *Anatomie humaine*. Paris: Masson et Cie,1967.

Stapfer, H. *Manuel pratique de gynécologie*. Paris: Librairie F. Alcan, 1912.

Taboury, J. *Guide pratique d'échographie abdominale*. Paris: Masson, 1982.

Tomatis, A. *La nuit utérine.* Paris: Stock, 1983.

Upledger, J. *Thérapie crânio-sacrée*. Paris: I.P.C.O., 1983.

Weischenk, J. *Traité d' ostéopathie viscérale.* Paris: Maloine, 1982.

Ordering Information

Order from:

BookMasters, Inc.
phone: 1-800-BOOKLOG (266-5564)
fax: 1-419-281-6883
e-mail: order@bookmaster.com
online: www.atlasbooks.com

For quantity purchases:

Stillness Press, LLC
PO Box 18054
Portland, Oregon 97218
phone/fax: 1-503-265-5002

Distributed in Europe by:

Osteopathic Supplies Limited
70, Belmont Road
Hereford, HR2 7JW
England
phone: +44 (0)1432 263939
fax: +44 (0) 1432 344055
online: www.o-s-l.com

Treating Visceral Dysfunction presents a well-defined and thoroughly researched approach to the osteopathic treatment of the abdominal organs that is also easy to apply. Developed by two Belgian osteopaths, Georges Finet and Christian Williame, this approach is based on the studies they did to precisely determine the dynamics of the abdominal viscera as they shift in response to the motion of the diaphragm.

With this knowledge of the organs' movements and an understanding of the functional anatomy, the authors have developed a set of precise "normalizations." The goal of these is to restore homeostasis within the environment of the organ (the fascia), within the organ itself, and within the circulatory, lymphatic, and neurovegetative systems that regulate and are affected by the visceral system.

Finet's and Williame's extensive clinical experience with this treatment approach supports the osteopathic concept that structure and function are linked in the visceral system. They have observed that patients often will become free from their abdominal complaints when their disturbed organ dynamics are resolved.

Finet and Williame bring us a logical, methodical, and practical system for diagnosing and treating the abdominal viscera. I am impressed with the depth of their knowledge, the research they have done, the simplicity of their techniques, and the results I have achieved with their approach in my practice. They have written a landmark book for the profession of osteopathy.

KENNETH LOSSING, D.O.

This book is the product of several years of abundant and far-reaching study and research, and I wish to pay tribute to the authors' intellectual honesty and their talent in passing on the results of their work.

ROBERT KRIWIN, D.O.
President, Belgian Academy of Osteopathy

ISBN 0-9675851-2-0
90000>
9 780967 585123

STILLNESS PRESS